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MR. PRESIDENT AND GENTLEMEN,—Although new methods of treatment of heart disease have been introduced, it is questionable whether any addition of great value has been made to the armamentarium of our predecessors. The advantages of rest, of suitable diet, and of digitalis were well known to them. What has been done is to analyse and test more exactly the measures which are beneficial and to define with more precision the conditions and the cases for their suitable application.

"CARDIAC TONICS."

The term "cardiac tonic" is still in common use and is employed somewhat indefinitely. It is applied to drugs which are supposed to stimulate or increase the contractile power of the heart. Some cardiac tonics are supposed to act directly on the musculature and others through the nerves of the heart. If one takes a list of the so-called cardiac tonics and tries to ascertain the exact action of the individual drugs it will be difficult to state precisely what special result is to be looked for. Digitalis and its allies, strophanthus and squills, stand apart from all the others in this respect.

Balfour (1897) held that the fundamental action of the digitalis group was to increase the elasticity of the muscular fibre of the heart, so that it expanded more slowly and contracted more perfectly. Broadbent (1897) considered that digitalis caused a more complete expulsion of their contents by the energetic contraction of the ventricles, and also improved the suction action during diastole, thus withdrawing the blood which had been dammed back in the veins. Brunton found that digitalis acted on the cardiac muscle, on the intrinsic cardiac nerves, on the vagus centre in the medulla, and also on the arterioles. We do not find any clinical proof of the accuracy of these views. There was no precise knowledge of the underlying changes in cardiac failure which digitalis is specially fitted to remedy. Each authority seemed to draw his conclusions from few and imperfect observations, or even to make his observations for the purpose of supporting his previously formed conclusions. In many cases what would now be regarded as the outstanding changes in cardiac failure were relegated to an entirely subsidiary position.

It is interesting to note that 20 years ago the special symptoms which called for digitalis had been recognised. These may be summed up as cyanosis and dropsy, with a rapid, irregular pulse and breathlessness. This condition is most frequently due to auricular fibrillation, and is still the one in which the action of digitalis is most clearly demonstrated. Digitalis was used as a cardiac tonic, and having been found beneficial in this special type of case it came to be used indiscriminately in all forms of severe illness with cardiac weakness. When I was a house physician it would have been regarded as almost criminal to let a patient die without giving digitalis, whether the disease was pneumonia, typhoid fever, or pernicious anæmia. We believed that digitalis was the great cardiac tonic and always suitable if cardiac failure threatened. Other cardiac tonics and stimulants have had their day and are still used by those who believe they have seen good results follow from their use. Amongst them may be mentioned strychnine, caffeine, camphor, adrenalin, and pituitrin. The exact mode of their action on the heart, if any, has not been determined, and the type of case suitable for their application has not been clearly differentiated. Digitalis, however, holds its own in the present as in the past.

EFFECTS OF DIGITALIS IN VARIOUS CONDITIONS.

Progress has been made, and although differences of opinion may still exist we are a good deal nearer the answers to the questions why to use digitalis, when to use it, and how to use it. The progress of scientific medicine is often delayed by the existence of unscientific beliefs, and the employment of digitalis in heart disease is an illustration. The one outstanding fact about the action of digitalis which has been fully established is that it slows the action of the heart under certain conditions. I propose to consider how this slowing is brought about; what effects follow from the slowing; and whether the ascertained beneficial effects from digitalis are not to be explained solely as the result of this cardiac slowing. In doing so no attempt will be made to dispute the various effects on the cardiac muscle obtained by physiologists and pharmacologists in their experimental work with large doses of digitalis. The pharmacologist cannot produce in animals those changes in the tissues and functions of the heart which are the result of disease, nor can he form any estimate as to what the results of digitalis in therapeutic doses will be in the treatment of cardiac disease.

In ordinary language slowing of the heart means slowing of the rate of contraction of the left ventricle, and this is estimated clinically by the pulse-rate or, if necessary, by auscultation of the heart. We have already seen that an increase in the ventricular rate or a serious disturbance of the cardiac rhythm is never primarily ventricular in origin. The ventricle follows but does not lead the cardiac rate or rhythm, which is always initiated in some part of the supra-ventricular tissues. In diseased conditions an increase of rate or a disturbance of rhythm is also started in the supra-ventricular tissues. Consequently it would appear that treatment should be directed to the supra-ventricular tissues from which the disturbance proceeds.

Here are two further points to be considered. First, it has not been shown that digitalis in medicinal doses—and we are dealing solely with digitalis as a therapeutic agent—has any direct effect on the wall of the left ventricle. Consequently we must not assume that digitalis acts on the ventricular muscle. Secondly, it has been shown that the slowing action of digitalis is through the vagus nerve, but it has not been shown that the vagus has any direct action on the musculature of the left ventricle. These two points will be discussed more fully later. Meantime, assuming them to be true, we draw this conclusion—that digitalis slows the rate of the left ventricle without acting on the ventricle; and that it produces its effect through the vagus nerve, which also has no direct action on the left ventricle. It therefore follows that as the rate of the left ventricle is dependent on impulses proceeding from other parts (the supra-ventricular tissues), the action of digitalis through the vagus must be on these supra-ventricular tissues. In an attempt to slow the ventricular rate through the supra-ventricular tissues, there are two possible lines of action: (1) to check the rate of impulse discharge at some over-active centre, or (2) to block some of the rapid contractile impulses at the conducting tissues so that a diminished number of them reach the ventricle. Clinically it can be shown that in slowing the heart rate this is the mode of action of digitalis, as in the following types of cases.

I. *With Normal Rhythm and Rapid Regular Action.*

CASE 1.—A girl of 11 years had suffered from several attacks of rheumatic fever with cardiac involvement. After six weeks at a convalescent home she was readmitted to hospital because of increasing dyspnœa and rapid cardiac action. For the previous three weeks the cardiac rate had averaged 120 to 130 beats per minute. She had not been able to be out of bed for a fortnight owing to breathlessness.

There was no pyrexia and no evidence of active rheumatic infection. The cardiac rate was rapid, averaging 124, and regular, and the rhythm was normal. Præcordial pulsation was strong and the apex beat was felt 1½ inches outside the nipple line, while the right side of the heart was felt pulsating to the right of the sternum. The murmurs present indicated mitral and aortic regurgitation. The liver was enlarged, extending 2 inches below the costal margin.

After a fortnight's rest in bed and salicylate treatment there was no improvement, and it was resolved to try the effect of digitalis in slowing the heart-rate. In 12 days the rate had fallen to 68, the amount of digitalis taken in that

[1] Lectures I. and II. were published in THE LANCET of March 17th (p. 401) and 24th (p. 437), 1917.

time having been 12 granules of digitalin (Nativelle), gr. 1/240 in each. Four days after the digitalis treatment was begun the heart was beating regularly at 80 per minute, and with a normal rhythm, as shown by the tracings. At the end of the course the apex beat was felt ½ inch outside the nipple line, and the right border of the heart did not extend beyond the right margin of the sternum. The liver edge was just palpable at the costal margin. The patient expressed herself as feeling very well, and was allowed out of bed, when she found she could walk about without any breathlessness. The action of the digitalis was successfully maintained after she left the hospital by small doses of digitalin. In this case the diminution in the size of the whole heart, coincidently with the slowing of the rate, was very striking.

This type of case is a common one in adolescent life. Rheumatic infection has led to carditis, in which myocardium, pericardium, and endocardium may be involved singly or in combination. Active signs of rheumatic infection (fever, &c.) are absent, but there is a persistently rapid cardiac action, the rate being from 120 to 140 at rest. In mild cases there are symptoms of cardiac weakness, as shown by the languor, disinclination for exertion, and shortness of breath when any exertion is made. In more severe cases symptoms of cardiac failure may be present and the breathing distressed, even when the patient is in bed. The rapid cardiac action seems to be an important factor in producing the cardiac weakness which leads to these symptoms. Digitalis grips the vagus nerve and stimulates its inhibitory action which tells on the first centre reached—namely, the sino-auricular node. The rate of impulse discharge here is diminished and a slower rate of the heart is established at the sinus, which leads to the slower ventricular rate. In cases of this kind, and they are not uncommon, we find no evidence of any direct action of digitalis on the contraction of the left ventricle or on the rate of the left ventricle. We trace the slower and stronger contractions of the ventricle directly to the slower cardiac rate established at the sino-auricular node.

II. *With Auricular Rhythm and Rapid Regular Action.*

CASE 2.—A boy of 10 had suffered for some years from occasional attacks of paroxysmal tachycardia. They had become more frequent and more persistent until at the end of an attack lasting for a month signs of cardiac failure set in. Apart from the cardiac condition, there was no evidence of disease in any part of the body, and he had never shown any sign of rheumatic infection.

The heart rate was 180 per minute and regular. There was diffuse præcordial pulsation, not forcible, and considerable dilatation of the heart to right and left. Strong venous pulsation was to be seen and felt in the neck. A soft systolic murmur was audible over the præcordia. The radial pulse was very small, feeble, and rapid, but apparently all the cardiac pulsations reached the wrist. The breathing was laboured and the ears were dusky. The liver was enlarged and free fluid was present in the peritoneum, while there was some œdema of the lower extremities and of the abdominal wall. Tracings showed an abnormal cardiac rhythm which was not of sinus origin but arose somewhere in the supra-ventricular tissues and most probably in the auricles.

After moderate doses of digitalis the cardiac rate fell to 96, the action was much stronger, and the dilatation was less marked. Diuresis set in, the dropsical symptoms rapidly disappeared, and the boy felt much relieved as regards his breathing. On stopping the digitalis, however, the rapid cardiac rate quickly returned, and this happened after each successive course of digitalis. An effort was therefore made to establish a firmer hold on the cardiac rate by means of digitalis. He was ordered 45 drops of the tincture of digitalis daily, and during 19 days he took 11 drachms in all, a dose being omitted occasionally when nausea or headache was present. This had the effect of producing marked instability of the cardiac rate, so that it changed from fast to slow with great frequency, on the slightest stimulus, and usually without any recognisable cause. The patient stated that he could always change the rate by breathing deeply. In the fast periods the rate was always the same, 170 to 180 per minute, and the abnormal auricular rhythm was present. In the slow periods the heart rate would at one time be 42 and at another a normal one of 80, while in both cases a normal rhythm would be present. A few days later the normal rate became established with very few and brief periods of tachycardia.

We had here a case of very rapid cardiac action, the impulse starting presumably in the auricular tissues, and the ventricle eventually showing signs of exhaustion from over-action. There was no evidence of rheumatic or other infection, and the heart was sound until the onset of the tachycardia. Here again digitalis would appear to have gripped the site of impulse formation in the auricle, passing by the sino-auricular node which was thrown out of action by the new focus, but large doses of the drug and a large total amount were required before the inhibitory effect of the vagus was fully developed. The large doses were probably rendered necessary by the fact that the centre of disturbance was a particularly active one, as shown by the severity and the persistence of the tachycardia.

III. *With Auricular Rhythm and Rapid Irregular Action.*

In the form of auricular fibrillation this is a common condition, and the beneficial action of digitalis is now well known. How it acts would appear to be as follows: The sino-auricular node is out of action as auricular fibrillation is a state in which multiple stimuli originate all over the auricles and dominate the cardiac rhythm. Fibrillation itself is so firmly established that the vagus has no effect in checking it. The inhibitory action of the vagus may be regarded as passing over the heart until it reaches the auriculo-ventricular node and bundle, which convey the stimuli from the auricles to the ventricles, and producing there diminution of the conducting power (conductivity), the so-called partial heart-block. By this means many of the impulses passing towards the ventricle are checked *en route*, the rate of ventricular stimulation is lessened, and the rate of the ventricular contractions gradually falls.

It may be objected that there is no proof here that this is the action of digitalis in auricular fibrillation, but few who have studied the subject have failed to accept the explanation. The inference has this further in its favour. The fibrillary contractions continue unaffected in the auricles and the ventricular contractions continue of the same kind as before, so that only the junctional tissues remain. On them digitalis and the vagus are known to act. It may be said that the mere slowing of the ventricular rate in auricular fibrillation does not explain the good results from digitalis, and that the drug has a real "tonic" action on the heart muscle. A case like the following has a bearing on this question.

CASE 3.—A married woman of 30 years sought advice because of increasing shortness of breath on exertion, although she was still carrying on her usual house duties. She had had rheumatic fever in childhood. The heart showed the characteristic signs of mitral stenosis in the form of a well-marked presystolic thrill and murmur. There was no left-sided dilatation, but the right side of the heart was somewhat enlarged. The cardiac action was regular at 84 beats per minute. The pulse was small and regular. The condition was, in fact, such as it might have been found on examination at any time during the previous 10 years, except that the right side of the heart was slightly more enlarged. The treatment ordered was largely negative—namely, the avoidance of anything inducing cardiac effort, for it has been my experience that no benefit is derived from drug treatment at this stage of mitral stenosis.

The patient was not seen again for three months, when she gave the following history. Up to 10 days previously she had gone on with her housework as usual. That night, about an hour after falling asleep, she woke with urgent breathlessness, and could not lie down. She felt the heart beat rapidly and thumping at times. The distress of the dyspnœa had gradually diminished and she had finally been able to come to the hospital.

The dyspnœa was still present, but she could lie down. The pulse was extremely feeble and rapid, with occasional stronger beats, but was very difficult to count. The cardiac rate was 140 and the action was grossly irregular—the so-called delirium cordis. The heart was much dilated, the liver was enlarged, and there was slight cyanosis. At the apex a systolic murmur was audible, and there was no trace of a presystolic thrill or murmur. Two days later she was admitted to hospital, when the pulse was found to be 140 per minute and very irregular. On the following morning she woke feeling that all dyspnœa had gone. This was clearly due to the spontaneous cessation of the attack of auricular fibrillation. The pulse was 96 and regular. I saw her next day when she was lying in bed without any sign of cardiac distress. The pulse was 90 and regular. There was a well-marked presystolic thrill and murmur at the apex, indicating the return of definite auricular contractions. The liver was normal in size. In a few days she was out of bed and going about the ward.

Two months later the patient had another attack of cardiac failure with similar symptoms, and was readmitted. Tracings showed the characteristic radial and venous curves of auricular fibrillation. The cardiac rate was 140 and the

action very irregular. On full doses of digitalis the heart slowed down, and later on moderate doses the rate was kept under 90. Although the patient's symptoms had been entirely relieved by digitalis the fibrillation and cardiac irregularity persisted.

Here a first attack of fibrillation passed off, and with its cessation the signs of cardiac failure rapidly subsided. No one will suggest that the cessation of fibrillation was accompanied by any special increase of contractile power in the ventricle, except that the rapid rate may have produced a certain amount of exhaustion. But the ventricle was left in peace—that is to say, it was freed from the showers of stimuli which were reaching it from above, and by reason of the slower rate its contractions became stronger. In a second attack digitalis secured the same result—namely, a slowing of the ventricular rate, and when that was established the signs of cardiac failure again disappeared. The fibrillation persisted, but the exhausting effects of its rapid rate were held in check. The only difference between the results in the two attacks was that in the first instance the heart reverted to a normal rhythm and rate, while in the other an abnormal rhythm of the heart and an irregular action of the ventricle persisted. These are not factors of the first importance provided that the ventricular rate is normal or slow.

IV. *With Normal Rhythm and Slow Regular Action.*

We may refer to the action of digitalis when the cardiac rate is normal and a sinus rhythm is present, and symptoms of cardiac failure have developed. This condition is most frequently met with in degenerative forms of cardiac disease, and after middle life. If one pushes digitalis here the usual result is to produce partial heart-block or sinus irregularity; the ventricular rate may be a few beats slower, but the chief effect is to substitute an irregular ventricular action for a regular. Even if this is not injurious if not pushed to an extreme, it is not at all an advantage, for a regular rhythm with harmonious interaction of auricles and ventricles is always to be preferred. This type of case does not, as a rule, show any benefit from digitalis, save that if dropsy is present a diuretic effect may follow, possibly due to an irritant action on the kidneys.

V. *With Auricular Rhythm and Slow Irregular Action.*

Cases of auricular fibrillation are sometimes met with in which the ventricular rate is slow and irregular. They have always appeared to me to be of a mild type of cardiac failure—that is to say, the subjects do not present the severe symptoms of heart failure seen in fibrillating cases with rapid ventricular action. They may have a limited cardiac response to effort, traceable rather to cardiac degeneration than to the fibrillation. One may infer that in such cases the degeneration has attacked the auriculo-ventricular bundle, and has already produced a condition of partial heart-block, so that the conducting tissues will allow of the passage of only a limited number of the stimuli which are coming from the auricles. Consequently in such cases one would not expect any benefit from digitalis, whose special action has already been anticipated by the changes resulting from disease, and in my experience digitalis is of no use. In some of these cases when the patient exerts himself the ventricular rate is greatly accelerated and symptoms of distress are then evoked. Digitalis may do good in this condition by preventing the acceleration of rate through an increase of the block in the conducting tissues. If digitalis had any direct effect on the contractile tissues of the heart it ought to be manifested in this type of case when signs of serious heart failure develop, such as œdema, cyanosis, and breathlessness, while the cardiac rate is not increased. Here, also, my experience has been that no benefit has followed the use of digitalis.

MODE OF ACTION OF DIGITALIS.

We have now got thus far that digitalis would appear to act through the vagus on certain parts of the supra-ventricular tissues. We have seen that this action may be on the sino-auricular node, or on some abnormal focus of impulse production in the auricular tissues, or on the junctional tissues. It has been established and accepted that this action is shown more frequently and more effectively in the case of cardiac disease resulting from rheumatic inflammation—that is to say, the other great class of cardiac disease, that due to various forms of degeneration, does not respond so well. It is not known, and it has not been suggested, that the vagus nerve is itself affected or in any way altered by rheumatic infection. The conclusion to which one is led is, therefore, that the cardiac tissues, those on which the vagus acts, are in themselves altered in some way so as to be rendered more sensitive to the action of the vagus. Rapidity of cardiac action means over-action in the stimulus-producing centre. Depression or moderation of over-action seems to be the great function of the vagus. One cannot depend on bringing into play this vagal action by means of digitalis in all cases of rapidly acting hearts, but there are some in which this action may be confidently expected, and they are especially those in which the heart has been affected by rheumatic inflammation. In connexion with vagal action there is also to be taken into account the fact that an over-acting centre tends to become exhausted and an over-stimulated conducting tissue tends to lose in conducting power. Thus the sino-auricular node may be so far prepared for an increase of vagal depression by its previous over-action, and the auriculo-ventricular bundle may be similarly prepared by over-stimulation from auricular impulses, as in the case of auricular fibrillation.

It would appear, further, that in the case of a rapidly acting heart which we desire to slow the problem is, will the vagus under digitalis stimulation be able to moderate the impulse-producing centre, or will the latter prove too powerful and maintain its rate? Under many conditions, as is well known, digitalis has no effect in slowing the heart, and here we may assume that the over-acting centre is too excitable. On the other hand, under other conditions the vagus can control the over-acting centre and check the disturbed action. When the vagus fails to check the rapid production of impulses to contraction at their centre, it has still a useful function left—namely, to prevent the disturbance reaching the ventricle through the induction of partial heart-block by diminishing the excitability of the conducting fibres. This protective method of heart-block is of extreme value in maintaining efficient ventricular action in many cases. One point about this action of digitalis may be referred to. It is an imitation of Nature's way of maintaining efficient cardiac (ventricular) contractions in similar conditions of distress. The natural means of preventing excessive ventricular rate and consequent ventricular exhaustion is by stopping a certain number of the impulses descending from above at the junctional tissues—a partial heart-block. This may or may not be sufficient. If it is not, by means of digitalis we can supplement the blocking action already existing and increase it to the extent necessary to relieve the ventricular distress.

If these views as to the action of digitalis are correct it would appear that the slowing effect on the left ventricle—from which we have traced all the benefit derived from digitalis—is accomplished without any action on the ventricular muscle. Further, it would appear that digitalis, the great cardiac "tonic," has no action whatever in medicinal doses on the cardiac tissues; it neither weakens them nor tones them up, but acts only on the vagus nerve by increasing its inhibitory functions. It does not seem necessary to assume any effect other than that of a slower rate, and the beneficial rest to the heart which follows.

Effect of Compression of Vagus Nerve.

By compression of the vagus nerve in man evidence is gained which supports the view that the action of digitalis is on the vagus and not on the heart muscle. Ritchie found that by digital compression of the vagus he could slow the whole heart, the normal rhythm being maintained, and the action being on the sino-auricular node. He could obtain no evidence of a direct action on the other tissues in the auricle, and in no instance has he observed auricular fibrillation to be checked or arrested by vagus compression. He failed to find any direct effect on the ventricles by vagal stimulation. Ritchie states that although in animals the conduction of stimuli to the ventricles through the junctional tissues may be impaired by vagal stimulation, in healthy human hearts he failed to obtain any depression of the conductivity of the auriculo-ventricular bundle unless there was some antecedent impairment of its function. In many cases of auricular flutter compression of one or other vagus was found to induce well-marked blocking of stimuli to the ventricles. Whenever the ventricular rate was slowed, the slowing was always the result of the action of the vagus on the supra-ventricular tissues. In cases of

complete heart-block the rate, rhythm, and strength of the ventricular beats were found to be uninfluenced by vagal stimulation.

We have already considered the clinical effects of digitalis on cardiac action. Now if we compare the results of vagal stimulation by digital compression there is a striking similarity in the effects produced. In both cases the results are primarily inhibitory and not augmentory of cardiac functions. In both cases there may be a local action on the sino-auricular node, the auriculo-ventricular node, or the auriculo-ventricular bundle, but never directly on the ventricles themselves. In the one case mechanical stimulation produces effects which are temporary and cannot be long sustained; in the other, digitalis produces identical effects which can be regulated and indefinitely prolonged. Still some would ask us to believe that as the vagus picks out certain areas and certain functions of the heart in the exercise of its physiological rôle, so digitalis picks out the same areas and the same functions in the exercise of its therapeutic rôle.

OBSERVATIONS ON DIRECT ACTION OF DIGITALIS.

We have seen the typical class of case in which digitalis is useful—namely, the rheumatic heart with a rapid rate or with a rapid and irregular rate, and signs of left ventricular failure. This class will comprise some 90 per cent. of the cases in which we can state before treatment that digitalis will do good, and the way in which it will do good, and the good which it will do. Regarding how many drugs can the same statement be made? We are not tied down to this class of case, because in a sense the investigation into the action of digitalis is only in its infancy—certainly it is very far from being completed. But we have reached this conclusion that it is foolish to give digitalis solely because of cardiac weakness or of cardiac dilatation or of valvular disease, irrespective of the special conditions present. It is equally foolish to refrain from giving digitalis because of some supposed action on the contractility or relaxation of the left ventricle, or because of the presence of some lesion supposed to militate against the use of digitalis such as aortic incompetence or mitral obstruction.

Physiologists somewhat vaguely, and pharmacologists more precisely, have dealt with the action of the vagus and of digitalis on the contractile power of the left ventricle. In this connexion one law must be kept in mind—namely, that the cardiac muscle, when it contracts, contracts with all the power which it possesses at the time. Gaskell puts digitalis into the class of substances which act in the direction of bringing about a tonic contraction of the left ventricle, as opposed to the muscarin class which brings about an atonic condition of that muscle.

Cushny has concluded from his experiments with large doses that digitalis strengthens the contractions and often lessens the relaxation of the heart by direct action on the cardiac muscle. Anything that Cushny writes about digitalis must be received with respect, but when he enters the clinical field we are at least entitled to offer criticism. The clinical problem he set himself to decide was whether the therapeutic effects of digitalis are to be attributed to stimulation of the inhibitory action of the vagus or to its direct action on the cardiac muscle. The method he employed was to paralyse the vagus by means of atropine before and after the use of digitalis. If a heart slowed by means of digitalis did not show an increase of rate under atropine he concluded that the slowing was due to a direct action of digitalis on the heart muscle, the vagus having been thrown out of action by the atropine. From a considerable number of clinical tests he drew the following conclusions:—

(1) The members of the digitalis group slow the pulse in a certain number of cases in which the rhythm is given by the normal pacemaker, and as a general rule this slowing may be removed by atropine, and is therefore inhibitory. In other cases, however, the sinus slowing and block are unchanged by atropine, and then arise from the direct action of digitalis on the conducting fibres from the pacemaker to the auricle, and from the auricle to the ventricle.

(2) In auricular fibrillation digitalis slows the heart from some direct action on the heart and not from stimulation of the inhibitory mechanism, for atropine does not restore the original rate of the released heart. The reduction in rate may be due to a direct depression of the conduction or of the excitability of the heart muscle by digitalis. But it is suggested that these functions are reduced indirectly through the improved nutrition of the heart from the augmented power of contraction of the heart muscle.

(3) The inhibitory stimulation induced by digitalis, therefore, does not play any part in the beneficial action of the drug, which is to be ascribed to its direct action on the cardiac muscle solely.

It is surprising to learn that in cases of auricular fibrillation, where the slowing of the ventricular rate under digitalis is so striking, the vagus does not come into play at all and an entirely different process is at work. I question whether this conclusion is justified by the clinical tests employed. The atropine test was employed when the vagus was fully digitalised—that is to say, when the vagus centre was being strongly and continuously stimulated. To paralyse the vagus, therefore, one required not an ordinary physiological dose of atropine, but a dose proportional to the degree of vagus stimulation by the digitalis. One may put a normal individual to sleep with 20 grains of bromide of potassium, but such a dose will do little to quiet an alcoholic subject suffering from delirium tremens. In order to make his tests conclusive Cushny ought to have greatly increased his dose of atropine. Not that I advise this continuation of his tests, because in all probability the patient would die from atropine poisoning before the vagus escaped from the grip of digitalis. The results which Cushny obtained are exactly those which one would expect in auricular fibrillation with the vagus fully digitalised, if one believed that the slowing of the heart was through the vagal action. Mackenzie, dealing with the same type of case as Cushny, differs as to the clinical facts and the conclusions to be drawn from them. He says:—

So far as our observations go the action of atropine in increasing the rate when it has slowed, seems to indicate that digitalis acts through the vagus nerve, both in the slowing which occurs in auricular fibrillation, and in partial heart-block.

But the clinical conclusions of these two authorities may be satisfactorily reconciled if we assume that the larger the amount of digitalis taken the bigger will the dose of atropine require to be in order to throw the vagus out of action. Mackenzie was dealing with small doses of digitalis and Cushny with large ones.

Consideration of Cushny's Conclusions from Clinical Side.

On the clinical side also one must take exception to the haziness of Cushny's conclusions as to the direct action of digitalis on the heart, after he considered that he had eliminated the vagal factor. "The reduction in rate may be due to a direct depression of the conduction or of the excitability of the heart muscle by digitalis." It certainly would be curious if digitalis imitated exactly the well-known functions of the vagus described in this sentence. "But it is suggested that these functions are reduced indirectly through the improved nutrition of the heart from the augmented power of contraction of the heart muscle." That is to say, that with a cardiac (ventricular) rate say of 150 the heart is so toned up by digitalis that the rate is slowed. But we find clinically that we cannot strengthen the cardiac contractions until the rate has been slowed down. We get no evidence of stronger contractions, and the patieat gets no relief from the symptoms, and the physical signs of cardiac failure do not alter until after slowing has taken place.

Is it not a commonplace of medicine that with a rapid cardiac action we cannot have a strong pulse? Take the case of a healthy young man with a rapid pulse under some form of excitement, and we find it small and weak. When the excitement has passed off and the heart rate has slowed, we find the pulse stronger and fuller. Does any clinician doubt that the cardiac action was weaker when the rate was rapid and that it was stronger when the rate had slowed and because the rate had slowed? Has experience not shown that the faster the cardiac rate the weaker are the contractions? Can we imagine digitalis producing in a rapidly acting heart the same powerful contractions which we know will follow from the mere slowing of the rate? This suggestion of Cushny's would appear to be merely a revival of the old pharmacological view, which was accepted therapeutically, that there must be some direct action of digitalis on the cardiac muscle. The acceptance of this view, without any proof as to its accuracy when the drug was used in medicinal doses, led to the great misuse of digitalis in the past.

Accepting the "all-or-nothing" action of the ventricle in contracting, we must take the other fact that if the ventricular rate is increased the contractions are weakened because the resting-time is diminished. Rest and relaxation

of the muscle are essential if the ventricle is to evolve its full power of contraction. Contraction, relaxation, and rest are the three elements in the normal ventricular action. Physiologists have taught that the tonicity of the ventricle is increased by digitalis and that the contractile power is increased, using large doses for the experimental proofs. If the tonic contraction of the ventricle is increased it follows that the relaxation is diminished *pari passu*, for a tonic contraction in the physiological sense means a prolonged contraction without relaxation. If the relaxation is diminished the complete filling of the ventricle cannot be effected. If the ventricle is not filled the efficiency of a ventricular contraction in carrying on the circulation must necessarily be impaired.

It is difficult to see how these results of poisonous doses of digitalis in physiological experiments can be made use of in cardiac therapeutics. The well-known experiment of bringing a frog's heart to a standstill in tonic contraction of the left ventricle has no bearing on our therapeutic dosage, for anything of this nature would be singularly inappropriate in an attempt to help a struggling ventricle. If physiologists say that the contraction of the ventricle is increased by digitalis through the vagus there is this further difficulty. The physiological action of the vagus is inhibitory; its recognised effect under digitalis is to inhibit cardiac functions—for example, inhibition of rate, inhibition of conductivity, inhibition of excitability, &c. So that if it should under the same conditions *increase* the contractility of the ventricles, there would be a change in the normal function of the vagus which can only be described as puzzling. Gaskell, however, definitely states that the "staircase phenomenon" which arises after an experimental standstill of the whole heart through vagal stimulation is due to exhaustion of contractility. He points out that the vagus stimulation depresses all the functions and their restoration is gradual, the restoration of contractility being shown by a gradual increase in the strength of the beat—the staircase phenomenon.

Conclusions as to Different Actions of Digitalis.

Cushny's conclusions as to the action of digitalis in cases with a normal rhythm of the heart are also difficult to follow, and for this reason. He finds that in some cases this action is inhibitory and through the vagus, while in others there is a direct action of digitalis on the conducting fibres from the sino-auricular node to the end of the auriculo-ventricular bundle. So that in the same class of case we have two entirely different actions of digitalis, the one on the nerve and the other on the muscle. This is a difficult doctrine to accept, but it does not complete the exposition of the action of digitalis. In the fibrillating cases, that is, those with an abnormal rhythm, these explanations are dropped, and he suggests a third—namely, "an augmented power of contraction of the heart muscle." From these statements one gathers that in Cushny's clinical experience digitalis may stimulate the vagus directly, or may depress the conductivity of the heart directly, or may increase the contractility of the heart directly. The path of clinical medicine is not made smooth by such varied and uncertain action on the part of digitalis. Surely if we can explain our therapeutic results by one line of action, clearly aimed at and clearly manifested in clinical work, we shall prefer it. The line of action is that digitalis acts on the supra-ventricular tissues through the vagus nerve, and by checking impulse production or impulse conduction slows the rate of the ventricles.

It would appear that nature has not supplied any natural paths by which the ventricles can be stimulated directly to increased contraction. In the field of experimental medicine Ritchie and others have failed to produce a direct effect on the ventricular contraction by stimulating the vagus. The effects of stimulation of the accelerator nerves of the heart by experiment or by drugs have not shown any definite action on the ventricles. Is it not possible that the natural powers are the best defenders of ventricular action and that our efforts to aid it by direct stimulation are wasted? If we consider the condition of a patient suffering from paroxysmal tachycardia, the heart having been previously healthy, we may find marked signs and symptoms of cardiac failure. On the occurrence of spontaneous cessation of an attack there is a rapid disappearance of all the signs of cardiac distress. Is it any use giving drugs to increase the cardiac (ventricular) contractions? The heart has been beating at a rate of about 200 per minute. It is impossible for the contractions to be powerful at that rate; the only question is, Will they be sufficient to carry on the circulation? When the pulse-rate drops to 80 the whole scene changes, and by the mere slowing of the rate the cardiac (ventricular) contractions at once becomes stronger and an efficient circulation is established. If given a sufficiency of rest and relaxation the ventricle is quite capable of doing all that is required in the way of contraction. A similar state of affairs is seen in cases of auricular fibrillation, as already referred to, when the cessation of an attack is quickly followed by the return of the heart to the *status quo ante*. The ventricle needs no stimulation to bring out its contractile power when rest and relaxation are afforded. So when digitalis is used in the case of auricular fibrillation and the same relief of symptoms follows the slowing of the ventricular rate, it seems superfluous to bring in as a pharmacological explanation an assumed action of digitalis on the contractile powers of the ventricles.

Clinical Experience in Support of Digitalis Acting Beneficially by Slowing of the Heart.

If digitalis has any therapeutic action on the wall of the left ventricle it ought to be capable of clinical demonstration. The typical case for this purpose is not uncommon—namely, one in which there is a failure of the left ventricle with a normal rate and rhythm of the heart, and with definite signs present, for example, œdema, oliguria, and breathlessness. A record of a series of cases of this type, with details as to the benefits which followed from the use of digitalis, would go far to settle the question as to the direct action of digitalis on the ventricles. But I do not find such cases to be common amongst published records and I cannot supply any from my own experience.

Recently the electrocardiograph has been employed to test the effect of digitalis on the cardiac records and certain changes have been discovered in the ventricular peaks, notably in the T wave. Further, under full doses of digitalis a ventricular extra-systole sometimes occurs. It is scarcely convincing to assume from these facts that digitalis acts directly on the ventricular wall. As bearing on the subject of the action of digitalis on the wall of the ventricle there is this fact to be remembered. When the cardiac rate has been much reduced by digitalis, say to 40 ventricular beats per minute, as the result of full doses, we sometimes find that the ventricle "escapes." Ventricular escape means that the ventricle starts its own independent rhythm and contracts when the pauses between the normal beats are very prolonged. This shows that the ventricle itself has been so little affected by digitalis as compared to other parts of the heart that its idio-rhythm emerges unaffected and unimpaired whenever an opportunity presents itself. We have little evidence of the other functions of the ventricle being affected directly by digitalis, and we can state definitely that the idio-ventricular rhythm is not affected at all.

The other great cardiac tonic is rest. Why does rest relieve the weakened or failing heart? There is no question here of a direct tonic action on the cardiac muscle such as has been claimed for digitalis. There is no positive action of any kind on the cardiac muscle. But there is a negative one in the diminution or cessation of the rapid cardiac action which follows from physical exertion and mental excitement. In other words, rest leads to a slowing of the cardiac rate, and from this slowing follow those benefits which have already been described as the result of digitalis therapy. So far as we are entitled to dogmatise from clinical experience, we may say that all the ascertained benefits derived from digitalis and from rest in rapidly acting and failing hearts are to be traced to one and the same result—namely, the slowing of the heart-rate. This slowing may be brought about in different ways and by various means, but it is the best cardiac tonic we possess.

NEED OF FURTHER INVESTIGATION.

While digitalis gives its most striking results in cases of very rapid and grossly irregular cardiac action, further investigation is required as to its value in less severe cases and before signs of definite cardiac failure have manifested themselves. There is a large class of sufferers from cardiac insufficiency—that is to say, the reserve power of the heart has gone and the response to anything save mild exertion is very limited. Take the case of mitral stenosis where the above conditions are present, but where the pulse-rate is still

normal or slow. I do not anticipate any benefit from digitalis in such a case.

In others, however, we find the pulse-rate persistently rapid and much increased on exertion. It is extremely probable that this increase of rate has a definite result in the way of producing over-action and weakening of the left ventricle, as well as of the right. In several cases of this nature I have given digitalis in order to prevent weakening of the heart and to postpone, as far as possible, the onset of cardiac failure. It has seemed to me that distinct benefit has followed in these cases from the slowing of the heart induced by digitalis. The action was always on the sino-auricular node, so that the normal rhythm was preserved, and the patients had always had rheumatic infection, so that the heart may have been in a sense prepared for digitalis. As a preventive of cardiac failure, the usefulness of digitalis in slowing the heart under these special conditions might be further tested.

CONCLUSION.

I have now dealt, very imperfectly as I know, with some additions to our knowledge of heart disease, and some changes in our views regarding it. As an observer I cannot reproduce to you the results exactly as they are but only as they appear to me to be. Looking backwards we recall with gratitude the light thrown on the subject of heart disease by eminent clinicians in the past. Advance in clinical medicine and by clinical methods has not come to a standstill. Looking forwards we see one of the best guarantees of future progress in the existence of a band of British workers who are devoting themselves enthusiastically to the further elucidation of the problems of heart disease. May I add that this College desires to extend to them all the support and encouragement in its power.

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FURTHER EXPERIENCES WITH

EMETINE BISMUTH IODIDE IN AMŒBIC DYSENTERY, AMŒBIC HEPATITIS, AND GENERAL AMŒBIASIS.

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(Report to the Medical Research Committee.)

IN THE LANCET of August 19th, 1916, Dobell and myself briefly described three cases of infection by *Entamœba histolytica* treated by emetine bismuth iodide. Two of these have since been followed up accurately, one W. (No. 3) by Dobell, the other C. (No. 2) by myself. Neither of these has ever shown *E. histolytica* cysts again and C. has had no further clinical signs of dysentery. Dietetic errors and cold and damp have, it is true, produced a certain amount of abdominal discomfort and slight pain, but, after extensive ulceration of the bowel, one could not expect otherwise. With these symptoms no blood or mucus appeared in the stools and, as stated above, no parasites were found. Coincident with the disappearance of the dysenteric symptoms the patient improved in general condition and gained weight. Both these cases, I think, may be considered as complete and permanent cures. Tables I. and II. show at a glance the detailed examinations of the stools.

The value of the double iodide of emetine and bismuth, by the mouth, in the treatment of histolytica carriers is now fully recognised; it remained to be seen, however, whether the drug would be equally efficacious in cases where liver involvement had also taken place. In the following series of cases to be described three cases of amœbic hepatitis figure and, as will be seen later, very good results have also been obtained. In addition an example of the somewhat rare condition "general amœbiasis" is included. By this term is meant a febrile state without dysenteric and manifest liver symptoms, yet responding quickly to treatment by emetine. *E. histolytica* cysts may be found only with great difficulty, but if sufficient numbers of fæcal examinations are made they should eventually be demonstrable.

Method of administration.—To begin with, keratin-coated tabloids and stearettes were tried and appeared to act satisfactorily. In one instance, however, suspecting that the drug was not being absorbed, the stools were carefully examined and three stearettes were recovered quite unchanged. The uncertainty of such an occurrence taking place in other cases decided one therefore to employ the drug in all the other patients as the loose powder in an ordinary gelatin capsule, similarly to the first cases treated by Dobell and myself. The dosage in all the series has been 3 grains nightly for 12 consecutive nights, as originally recommended by Dale.

A certain amount of sickness occurred in some of these, but this was never of sufficient importance to interfere with the continuation of the treatment, and the same may be said of the diarrhœa which is sometimes met with. To prevent sickness the precautions that were of use in the ipecacuanha days may be employed, the drug, however, in this instance being given on a full and not on an empty stomach. During the course the patient is better kept strictly in bed, the diet being arranged in accordance with the acuteness or chronicity of the symptoms. For most cases a light diet consisting of milk, white meat, and white fish will be found most suitable. At 10 P.M. a small meal should be given, arrowroot, sago, tapioca, or cornflour with a little milk, for example and then immediately after this the capsule is taken. Five to ten minutes later some boiling water should be sipped, and this should be repeated if any sign of nausea or sickness occur throughout the night. For the first few nights, until one sees how the patient is to tolerate the drug, the pillows should be removed so as to keep the head low, no movement should be allowed, and if saliva accumulates in the mouth it must on no account be swallowed, but should be expectorated or removed by cotton swabs. If after all these precautions the patient is still sick a mustard leaf may be applied to the epigastrium on subsequent evenings, or 10 to 20 minims of tinct. opii may be given half an hour before the administration of the emetine. Such precautions will greatly mitigate, if not entirely prevent, sickness.

The occurrence of this symptom is a very variable one; sometimes the first doses produce it and then a tolerance is established, while in other cases it appears towards the end of the course or irregularly throughout it. Three to four hours after taking the capsule is the usual time for the sickness to appear; there may be one emesis and then no more,

or this may be followed up by others with some nausea and discomfort on the following day. In private practice and in ordinary civil hospital practice, when the drug is given in a proper manner and with the ordinary precautions the symptom is of little importance, and may be entirely disregarded in the majority of the cases. In the old days such patients used to take their ipecacuanha without any trouble, the symptoms produced being much more unpleasant than those met with in the above drug.

As regards diarrhœa, a certain amount of this is beneficial rather than otherwise; if excessive it may easily be checked by the administration of opium.[1]

Notes of Cases.

General amœbiasis.—History.—Patient (McC.) went to Africa April, 1916. He soon had some slight attacks of malaria, but otherwise kept well. In October of the same year he began to feel run down and got tired very easily. He then went and consulted Dr. Gray at Lagos, who, on examining his stools, found *E. histolytica* cysts present. Seven injections of emetine, gr. 1, were given and the patient returned to work. General weakness and the tired feeling soon appeared again, so it was decided to send the patient home.

Examination.—Temperature varying from to 101–102° F. at nights. Looks seedy and has lost weight. Teeth black, but sound. Small glands palpable in posterior triangles of neck. Lungs nil. Heart sounds a little weak; pulse 100, feeble. Liver, perhaps a little enlarged upwards, level of 5th and 6th ribs and costal margin. Spleen not palpable. No pain on shaking liver nor on deep pressure and percussion. No pain or tenderness over colon. Blood examination: R., 4,600,000; W., 13,000; Hb, 90 per cent. Differential count per cent. was: Polymorphs, 70·5; large mononuclears, 10; lymphocytes, 17·5; eosinophiles, 0·5; transitional, 1; mast cells, 0·5. Number counted, 200. No malarial parasites or trypanosomes. Urine: No albumin, blood, or sugar. Fæces: Heavy infection with *Entamœba coli* cysts, one amœba ? species. Two doubtful cysts that might have been histolytica. Wassermann reaction negative on two occasions.

As regards a past dysenteric history, the patient stated that he had never had clinical signs of dysentery nor, as a matter of fact, even any diarrhœa. He was very emphatic about this. Further, he never had had any liver pain or tenderness, his only clinical signs being weakness, some loss of weight, and irregular temperature.

Treatment.—As his temperature was high and I did not like his appearance, and as Dr. Gray had found definite histolytica cysts in his fæces in Africa, I did not wait, but started a course of emetine bismuth iodide at once. This was begun on the night of Jan. 11th, 1917, and its effect upon the temperature was at once apparent, this quickly dropping to normal. As marked as this was the effect of the drug on the patient's general condition, he stating that he felt very much better and, further, his leucocytes, which were raised when he came into hospital, also became normal.

Further history.—The improvemeat has continued up to the date of writing this paper, the patient has had no further fever, he has steadily gained in weight, histolytica cysts have not reappeared in the fæces, and to all intents and purposes he is cured.

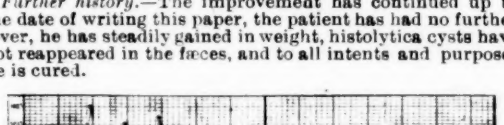

Chart showing the temperature of patient (McC.).

Table III. shows his fæcal and blood examinations and the chart his temperature. A study of the former shows that the coli cysts, though disappearing at first, returned and became as numerous as before, a point specially noted by Dobell in several of his series of examinations.

Amœbic Hepatitis Cases.

1.—*History.*—Patient born in England, went abroad to India in 1900. Served there since with usual leaves home. Came home to England April, 1916. Previous illnesses: Attack of dysentery three years ago, very bad one. Since that date had had relapses off and on. Last attack a month ago. A little blood and mucus. Twelve stools a day one day during this period. Treated in India. ? ipecacuanha, never emetine. Frontier sores two years ago, malaria several attacks, never venereal. Present condition: Lately has been very weak, and this has gradually been getting worse. Has lost weight, about a stone; sweats at nights.

Examination.—Looks ill. Teeth very bad. Stripped, very thin. Apices shrunken, poor chest, somewhat pigeon-shaped. No definite signs of tubercle; no dulness at right base. Heart sounds faint; no murmurs. Liver level of 6th and 7th ribs and a little below costal margin; slightly tender at one place and uncomfortable on shaking. Spleen level of 9th–11th ribs. Urine: No albumin, blood, or sugar. Fæces: No amœbæ or cysts first examination. A further examination three days later showed scanty histolytica cysts. Blood examination: R., 4,900,000; W., 14,000; Hb, 95 per cent. Differential count: Polymorphs, 74; large mononuclears, 4; lymphocytes, 20; eosinophiles, 1; transitional, 1 = 100.

Diagnosis.—Amœbic hepatitis. ? abscess commencing.

Treatment.—Usual course of emetine bismuth iodide, 3 gr. nightly for 12 consecutive nights. Stearettes were used to begin with, but later were crushed up into powder, as about this same time I had another case in which these were passing unchanged. The patient quickly lost his liver pain. He expressed himself as feeling very much better, his leucocytes fell to normal, and he began to pick up weight. No cysts have been found in his stools since taking his course. Though still a little nervous and excitable, symptoms not associated with dysentery specially, he is now well and has had no further signs of liver pain. Table IV. shows the results of his treatment at a glance.

2.—*History.*—Patient had lived in India for 12 years. Previous illnesses: Enteric in 1906. Slight attacks of colitis on several occasions, never off duty for these. One attack of malaria only. Pleurisy 4 years ago, left side. Present illness: While at home in England 2½ years ago got an attack of liver. Returned to India at the outbreak of war and went to Mesopotamia in November, 1914. Kept well for the first six months. After that began to get diarrhœa, liver became enlarged and tender. Had rises of temperature also. *E. histolytica* found in stools. Given emetine, 7 doses of ¼ gr. each. Improvement on voyage home, but on arrival not feeling fit and liver still tender. Dr. Stevenson examined his stools and found active amœbæ and cysts (*E. histolytica*).

Examination.—Slightly cachectic-looking, cheeks sunken, conjunctiva a fair colour. Lungs and heart nothing of importance. Liver enlarged, edge felt below costal margin, left lobe tender and felt hard. Spleen level of 9th–11th ribs. Urine: No albumin, blood, or sugar. Fæces: Free amœbæ and cysts. *E. histolytica* (Stevenson).

Diagnosis.—Amœbic dysentery and amœbic hepatitis.

Treatment.—Emetime bismuth iodide, gr. 3 nightly, for 12 consecutive nights. (First part of course stearettes, latter part same crushed into powder.)

Progress.—The amœbæ and cysts quickly disappeared from the stools and have not reappeared. The liver tenderness still persisted, however, a month and a half after the treatment. It is probable that this is due to adhesions having formed between the liver and diaphragm, or between the liver and adjacent viscera. The patient has improved in health and gained in weight, but is not yet normal.

Table V. gives the details of his fæcal and blood examinations.

3.—*History.*—Patient (McG.), born in Scotland, went to Burma in 1912; in Rangoon in civil employment. Joined Army in 1914; France early in 1915; left there in December, 1915, and went to Mesopotamia, arriving in January, 1916. Invalided for jaundice and dysentery to Bombay; there two months, then sent home. Previous illnesses: Fever at times in Burma, no dysentery there, no venereal. Present illness: Dysentery in Mesopotamia. Seven to eight stools a day. No blood, mucus only; severe tenesmus. Given emetine four injections of 1 gr.; this stopped the dysentery at once, all symptoms disappearing. After this jaundice and abdominal pains. While in hospital at Bombay Widal negative to all typhoid group and nothing grown from stools; rigors and pain over gall-bladder, also bad pyorrhœa. Lately tendency to constipation and pain over gall-bladder region still.

Examination.—Heart and lungs nil. Tender over liver on deep percussion and also tender on pressure over lower border of liver in gall-bladder area. Liver enlarged both upwards and downwards. No tenderness over colon. Spleen not palpable. Blood examination: R., 5,000,000; W., 6000; Hb, 100 per cent. Differential count per cent.: Polymorphs, 63; mononuclears, 11; lymphocytes, 22; eosinophiles, 2; transitional, 1; mast cells, 1. Films: No malarial parasites. Urine: No albumin, blood, or sugar. Fæces: *E. histolytica* free, minuta stage. *E. histolytica* cysts. *E. coli* cysts. No ova.

Diagnosis.—Amœbic dysentery carrier, amœbic hepatitis.

Treatment.—Painted tender area with lin. iodi. Course of emetine bismuth iodide, gr. 3, in powder in gelatin capsules for 12 consecutive nights.

Progress.—The patient took his first three doses without trouble, but was sick after the fourth. After this there was no further sickness, but a diarrhœa started, which, however, was easily controlled by tinct. opii. About the middle of the course the pain over the liver diminished and he felt better. On Jan. 23rd, the day after the course was finished, he passed some mucus in his stool and felt his liver a little,

[1] Dr. H. H. Dale, who has read this paper in manuscript, tells me that recent experience seems to indicate that the trouble of nausea and vomiting may be eliminated, or reduced to trivial proportions, by giving the double iodide in pills coated with sa'ol. Of a number of formulæ which have been tried the most successful was a pill with simple syrup as excipient and salol coating. Such pills usually pass through the stomach without causing trouble, and appear to break up satisfactorily in the intestine, so that the curative effects are good.

TABLE I.—*W. No. 3.*

Date	June, 1916 9	14	15	16	17	18	19	20	23	24	26	28	July 30	3	5	7	8	10	13	15	21	24	28	Aug. 8	14	22	28	Sept. 5	11	19	26	Oct. 7	9	28	Nov. 6	16	29	Dec. 8	22	29	Jan., '17 13	24	Feb. 8
—		E	E	E	E	E																																				
E. h. c.	+	++	+	+	+	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−

TABLE II.—*C. No. 2.*

Date:	1915 Dec. 20	1916 Jan. 13	Feb. 23	July 4	11	14	19	20	21	22	23	24	25	26	27	28	29	30	*Aug. 31	10	14	23	25	28	30	Sept. 1	6	9	13	20	Oct. 3	11	Nov. 18	1	8	15	22	29	Dec. 6	13	Jan., '17 10	17
—							E	E	E	E	E	E	E	E	E	E	E																										
E. h.	−	−	−	−	++	+	−	−	−	−	−	−	−	−	−	−	−																										
E. h. c.	−	−	−	+	−	+++	+++	+++	++	+	−	−	−	−	−	−	−																										

* I am indebted to Mr. Redman King for the results of the examinations made during August and September while the patient was staying at Barton.

E = Treatment with emetine bismuth iodide, gr. 3. + = Positive result, small infection. ++ = Moderate infection. +++ = Heavy infection. − = Negative result. E. h. = *Entamœba histolytica*, amœboid stage. E. h. c. = *Entamœba histolytica* cysts.

TABLE III.—*General Amœbiasis.*

Date: Jan., 1917 11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Feb. 1	2	3	4	5	6	7	8	9
	E	E	E	E	E	E	E	E	E	E	E	E																		
E. h. c.	?	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
E. c. c.	+++	+	+		+	−	−	+	−	−	−	−	−	−	−	+	−	−	+++	++	++	+++	+	+	−	+	++	++	+	+

Leucocytes.—Jan 11th: 13,000; 12th: 13,100; 13th: 13,000; 15th: 12,500; 16th: 12,200; 17th: 11,800; 18th: 11,200; 19th: 9000; 20th: 8900; 21st: 8000; 22nd: 7000.

Temperature raised at beginning, came quickly to normal after the emetine begun. See chart. E. c. c. = *Entamœba coli* cysts. Other signs as before.

TABLE IV.—*Amœbic Hepatitis (No. 1).*

Date	Dec., 1916 4	7	8	9	10	11	12	13	14	15	16	17	18	1917: Jan. 20	21	12	Feb. 6
		E	E	E	E	E	E	E	E	E	E	E	E				
E. h.	−	−				−	−	−	−	−				−	−	−	−
E. h. c.	−	+				−	−	−	−	−				−	−	−	−

Leucocytes.—Dec. 4th: 14,200. 7th: 16,800. 8th: 14,000. 9th: 14,000. 11th: 10,000. 12th: 9800. 13th: 7400. 14th: 7000. 18th: 6800.

No mark means stool not examined on that day. Other signs as before. This patient started his treatment with stearettes, after the 13th these were crushed up and given in powder form.

TABLE V.—*Amœbic Hepatitis (No. 2).*

Date	Dec., 1916 13	14	15	16	17	18	19	20	21	22	23	24	25	Jan., 1917 29	4	8	19	20	21	22	23	24	25	26	27	28	29	30	31	Feb. 1	2	3	4	5	6	7	8	9	10	11	12
		E	E	E	E	E	E	E	E	E	E	E	E																												
E. h.	++	+					−							−	−	−	−	−																							
E. h. c.	+	+					−							−	−	−	−	−																							

Leucocytes.—Jan. 19th: 6000; 20th: 7000; 22nd: 7200; 23rd: 9400; 24th: 5800; 25th: 6000.

TABLE VI.—*Amœbic Hepatitis (No. 3).*

Date	Jan. 1917 11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Feb. 1	2	3	4	5	6	7	8	9	10	11	12
	E	E	E	E	E	E	E	E	E	E	E	E																					
E. h.	+	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
E. h. c.	+	+	+	+	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
E. c.	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
E. c. c.	+	−	−	−	−	−	−	−	−	−	−	−	−	−	−	+	−	+	+	−	+	−	−	+	−	+	−	+	−	+	−	+	+

E. c. = *Entamœba coli*, amœboid stage.

TABLE VII.—*Convalescent Carrier Case (No. 1).*

Date	Nov., 1916 14	15	17	18	19	20	21	22	23	24	25	26	27	Dec. Jan., 1917 5	13	3	10	16	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Feb. 1	2	3	4	5	6	7	8	9	10	12	13
		E	E	E	E	E	E	E	E	E	E	E	E																															
E. h. c.	+++					−								−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
E. c. c.	+					−								−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−

TABLE VIII.—*Convalescent Carrier Case (No. 2).*

Date	Jan., 1917 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Feb. 1	2	3	4	5	6	7	8	9	10	11	12
	E	E	E	E	E	E	E	E	E	E	E	E																																
E. h. c.	++	++	+	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
E. c. c.	+++	++	+	+	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	+	+	+	+	+	−	−	+	+	+	−	+	+	+	+	+	+	+	+	+	+	+

TABLE IX.—*Relapsing Dysentery 26 years after Original Infection.*

Date	Dec., 1916 6	7	8	9	10	11	12	13	14	15	16	17	18	22	28
—	E	E	E	E	E	E	O	O	E	O	E	E			−
E. h.	+	+	−			−		−		−			−	−	−
E. h. c.	−	−	−			−		−		−			−	−	−

Date	Dec., 1916 6	7	8	9	10	11	12	13	14	15	16	17	18	22	28
—	E	E	E	E	E	E	O	O	E	O	E	E			
E. c.	?	−	−			−		−		−			−	−	−
E. c. c.	+	−	−			−		−		−			−	+	+

Stearettes passed unchanged on Dec. 12th, 13th, and 15th.

while there was also a slight rise of temperature the same evening. The blood showed leucocytes 10,600 with no sign of malaria. Two days after, the pain over liver disappeared and up to the present has remained quiescent. Convalescence though somewhat slow has been sure and there is reasonable hope of a permanent cure. Table VI. shows the results of his treatment at a glance.

Convalescent Carrier Cases.

1.—*History.*—Patient (Ch.) joined the Army in 1914. Went to India in October, 1914. Stayed there till March, 1915, when invalided home for heat-stroke. Before leaving also contracted dysentery. Treated for this on way home by emetine injections, four in all. Finally invalided out of Army for epileptic fits. Present illness: After leaving Netley was treated at home by rest in bed and milk diet. Got much better after this. Afterwards went to Bournemouth, began ordinary diet, this being followed by diarrhœa and severe bleeding. Another relapse in October, 1915. Next two fits. Then another relapse of his dysentery. Treated by ipecacuanha, ?dose, and by more emetine injections. During 1916 bowels still very loose and anything easily upset him. Lately has had constipation alternating with diarrhœa; pain in the abdomen as well.

Examination.—Heart sounds, nothing to note. Says he gets out of breath very easily if he takes any exertion. Lungs no signs of tubercle. Some pain over colon on deep pressure. Urine: No albumin, blood, or sugar. Fæces: *E. histolytica* cysts heavy infection, *E. coli* cysts; no flagellates, no ova.

Diagnosis.—Amœbic dysentery, cyst carrier.

Treatment.—Emetine bismuth iodide, gr. 3, powder in gelatin capsules, nightly for 12 consecutive nights.

Progress.—Improved after course very much, all diarrhœa and pain disappearing. Patient also felt stronger and stated that he had never felt so well since acquiring his dysentery. Cysts disappeared rapidly from his stools after commencing treatment and have not reappeared (Table VII.). On Jan. 18th, 1917, an intensive daily examination of the fæces was begun, this lasting for over three weeks. Cysts have been absent during the whole of this period, and a permanent cure may be confidently anticipated. All symptoms have disappeared and the stools now are normal in number and consistence.

2.—*History.*—Patient (Q.), born in Newfoundland, joined Navy in 1910; been in it since. After war in Mediterranean chiefly. Present illness: At Tunis, Sept. 16th, 1916, seized with dysenteric symptoms, mucus, blood, and tenesmus, but not much straining. Went into hospital. Emetine 15 injections in all, ? dose. Much better after these. Stools now one or two a day, normal. Pain in abdomen occasionally.

Examination.—Some bad teeth. Heart and lungs nothing to note. Liver level of 6th and 7th ribs and costal margin; spleen level of 9th–11th ribs; no pain in abdomen. Urine: No albumin, blood, or sugar. Fæces: *E. histolytica* cysts, moderate infection; *E. coli* cysts, heavy infection.

Diagnosis.—Old dysentery, amœbic carrier.

Treatment.—Emetine bismuth iodide, gr. 3, powder in gelatin capsules, for 12 consecutive nights.

Progress.—Histolytica cysts quickly disappeared (Table VIII.) from the stools and have not returned. The patient is well and now shows no signs of any abnormality in his bowels.

Relapsing Amœbic Dysentery 26 Years after Original Infection.

History.—Patient (McL.) had acute dysentery in Egypt in 1890. Ten years later in England a relapse, treated by ipecacuhana, promptly recovered. Since that date until December, 1916, no intestinal disorders of any sort. Present illness: Started with an attack resembling influenza. Pain all over and aching bones. Then suddenly seized with all the symptoms of acute dysentery: blood, much mucus, great straining, abdominal discomfort, and passage of numerous stools. Fæces: Stools typically dysenteric, much blood and mucus. Amœbæ present, *E. histolytica*, minuta stage, and coli cysts.

Treatment.—Stearettes of emetine bismuth iodide, 3 gr. in each, were immediately begun. The symptoms at once responded to these, the amœbæ disappeared from the stools, also the blood and mucus, and the patient quickly recovered. As constipation set in during the middle of the course, one suspected the possibility of the stearettes not dissolving, and an examination of the stool proved that this was so, three stearettes being recovered quite unchanged. (This is the case referred to at the beginning of the paper.) That the first stearettes did dissolve, however, is fairly certain, as there was considerable nausea after taking them and the symptoms cleared up so quickly. Since then there has been no clinical relapse. Stool examinations were only possible on three occasions after the end of the treatment. The case is reported to demonstrate the extraordinary chronicity of an amœbic infection.[2] Table IX. shows the treatment and fæcal examinations at a glance.

[2] See also Brit. Med. Jour., Dec. 23rd, 1916, for details of another example.

A brief study of this series of cases shows that emetine given by the mouth, as emetine bismuth iodide, is apparently as efficient as emetine by the needle in cases of amœbiasis with liver involvement. Ipecacuanha used to act also, it is true, but one of its disadvantages was the sickness so often produced, this being badly borne by patients suffering from severe liver pain. These facts must mean that sufficient emetine is absorbed into the general circulation to act on the parasites in the liver, it being conceded, of course, that parasites are actually there when hepatitis, enlargement of the liver, and leucocytosis are present, the precursors of a definite abscess formation. The advantage of oral administration over hypodermic in such cases would seem to consist of the more potent sterilising powers ultimately shown by the double iodide on the amœbæ in the bowel, thus removing a possible source of subsequent reinfection of the liver.

Dobell has shown that in cases treated by emetine hydrochloride subcutaneously 70 per cent. relapse, whereas when emetine bismuth iodide is employed by the mouth this figure is reduced to about 10 per cent.; or stating this as regards cures, only 30 per cent. are got by the former, 90 per cent. or more by the latter. If, then, the latter can get rid of the acute symptoms satisfactorily and at the same time quickly, it is the best drug to use, as it is much more likely to sterilise the patient completely of his parasites in the bowel lesions at the same time. In cases of great urgency it might be advisable to give some injections first and then to follow these up by the oral method.

A point one may mention here, especially so as many people appear to entirely misunderstand it, is that the emetine does not kill the cystic stage of the parasite; it kills the amœbæ or active living forms which are present in the tissues of the bowel. The cysts in the fæces are being cast off, and only indicate that there are living amœbæ in the bowel producing them. If all the amœbæ are killed, then there can be no further production of cysts; the stools become negative and remain so permanently.

As far as one can judge, then, at present, emetine bismuth iodide holds out good hope of permanent cures in the different varieties of amœbiasis, in the sense that the patient is entirely sterilised of his amœbæ. The subsequent course of the disease will depend upon the extent of the original lesions—namely, the amount of bowel denuded of epithelium, deep ulceration producing peritoneal adhesions, strictures of the bowel, adhesions between liver and diaphragm, or between liver and adjacent viscera, and so on. Attacks of pain, bouts of diarrhœa, and definite colitis are not infrequent even after all signs of amœbæ have disappeared. The patient, it must not be forgotten, must be strictly dieted for a long period after his course of emetine; he must avoid wet and damp, and should abstain entirely from alcohol.

Some clinicians still prefer ipecacuanha in these chronic relapsing cases. In the old days the drug acted very well clinically, but in the light of modern research careful and prolonged fæcal examinations would have to be made in order to determine the real value of such cures. If the emetine is the real essential in the ipecacuanha then a much larger dose can be given in a more convenient form by the use of the double iodide.

Finally, as regards dosage, if those who try the drug would attend carefully to the rules laid down for its administration there would be fewer disappointments. Some working standard must be adopted, and experience shows that that recommended by Dale of 3-grain doses every night for 12 consecutive nights (*36 grains in all*) is a good one. Dobell suggests that some cases may require an increased quantity, and in such the period may be extended even to 20 instead of 12 nights. Not less than *36 grains in all* should be given, as smaller quantities are generally followed by relapse. The case mentioned at the beginning of the paper (W., No. 3) is the only one, according to Dobell, that has been cured by so small a total as 15 grains in all—viz., 3 grains on five consecutive nights.

I have again laid stress on this dosage, as this has been misquoted and incorrectly stated, at least three times, in different journals.[3] It is to be hoped that those incorrect statements have not led people into errors in prescribing the drug.

[3] In an abstract of the paper by myself and Dobell (THE LANCET, August 19th, 1916) in the *Journal of the American Medical Association* (Sept. 16th, 1916, p. 908), again in the *Prescriber* (vol. xi., No. 24, January, 1917, p. 12), and, lastly, in the *Journal of Tropical Medicine and Hygiene* (Feb. 1st, 1917, p. 30) from subsequent papers by Dobell.

A CASE OF PSYCHASTHENIA WITH CRIMINAL IMPULSES.

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(*With the Permission of the Prison Commissioners.*)

WHILST states of psychasthenia are frequently met with, the psychasthenic with homicidal impulses would seem to seek medical advice early in the course of his disorder. It is exceptional for crimes of violence due to this condition to be met with in prison practice. For this reason the following case appears worth recording from the view of the medical jurist.

A single man, aged 33, a collier, was sentenced at a police court to one month's imprisonment or to pay a fine for assault on a woman. According to the evidence of the prosecutrix, a woman 25 years of age, while she was walking along a street she was suddenly attacked from behind by a man who put both his arms round her neck and threw her to the ground. Her head struck some railings as she fell. The man said nothing to her at all, and she had never seen him before. When she fell he seemed suddenly to realise what he was doing and went away, subsequently giving himself up at the police station and asking to be taken into custody.

The prisoner on admission into prison was 63¼ inches in height and weighed 120 lb., which is much below the usual weight for his height (say 138 lb.), and also below his normal weight, which a year before was known to be 126 lb. He was in fair general health, but pale and somewhat anæmic. He had a high degree of myopia, for which he wore spectacles. He showed no evidence of recent heavy drinking and was quiet and peaceable in demeanour. His memory, attention, and perceptive powers were good, as were his judgment and reasoning capacities. There was no exaltation, and no delusions or hallucinations were detected. He was not unduly depressed. His pupils were equal and reacted normally. The knee-jerks were normal. He slept and ate well. Nothing of importance was learnt concerning the family. He was, for his station in life, fairly well educated. He had played truant at school and had been caned there for boyish faults. He had had no serious illness until, some six years before the offence for which he was detained, he had an attack of enteric fever. He was not epileptic, but perhaps was occasionally intemperate. He had never been in an asylum nor under certificates, and so far as was known had never been under mental observation before, unless this was so during his prolonged stay in the workhouse after the attack of enteric, when apparently he had written to a relation speaking of suicide. On leaving school he worked in a pit, and this was his chief occupation. He stayed at one place for four years and remained at others for lesser periods. Only twice had he been discharged by his employer. During the last six years, after the attack of enteric, his conduct had been less satisfactory. He did not keep his situations so long, at times only did casual work, spent varying periods in workhouses, and had been in prison once for begging. On four occasions he gave up his work owing, he said, to a feeling of restlessness. On these occasions he would wander about the country until the unsettled feeling had passed off. He was emphatic that he had not been drinking to excess on these occasions, and his memory was clear as to the events that then took place. The desire to ramble did not appear to be related to epilepsy. He stated that for a considerable time past he had felt a recurrent desire to kill people; it was variable in intensity, but he had sometimes difficulty in restraining himself. He had followed people with the idea of attacking them, but had never actually done so before. He was afraid to trust himself, and in prison felt safer and better able to control himself than when outside. After very careful consideration this condition did not appear to be related in any way to alcohol.

Prior to reception into prison for five months he had been working at a pit, earning 35*s.* a week, and living with a near relation. Four days before the offence the restless, unsettled feeling already mentioned as having occurred before, came on. He left work and visited towns in the neighbourhood. On the day the offence was committed he had, he stated, previously followed another woman with intent to attack her, but she evaded him. He followed the prosecutrix for some short time, feeling impelled to attack her and trying to restrain himself from doing so, eventually attacking her in the manner already described. In so doing his spectacles fell off, and possibly for this reason the attack was less serious than it might otherwise have been. He made no attempt at robbing or of indecent assault, and there was no motive for his act. His memory was quite clear as to what took place; he realised that what he did was wrong, and fought against it. When the act was accomplished, however, he added that he felt easy in his mind. Being afraid that the impulse would again come over him he later gave himself up to the police. He stated that on the day he left his home and work he had too much to drink, but his memory was unaffected; the following days he was sober. It appeared, however, from close questioning that it was doubtful if he had been really intoxicated at all during this period. At each of several interviews he repeated the fact that the impulse to kill was very strong, that he had to fight against it, and that he felt no longer able to trust himself to combat it. Before his sentence expired his relations visited him and offered to take him home and keep him till he again got work, but he was afraid to trust himself and wished to be certified.

In determining whether his story was true or false the following points were considered:—

1. The reason he gave for committing the crime was that which best fitted in with the known facts of the case as a whole.

2. No reason could be discovered as to why he should concoct a false account.

3. It would be extremely improbable that a man in his position in describing his condition should mention all the main characteristics of psychasthenic impulses—viz., recurrence, consciousness, painful mental conflict before, and sense of relief after, action, with full knowledge of wrong-doing, and retention of memory, unless he actually knew of this combination through his own experience.

4. His attitude and demeanour at the various interviews impressed observers as being genuine. He made them feel that he really was distressed at his condition and afraid to be in the world again with only his own will to prevent him repeating the act. This impression was strengthened by the fact that he would not accept his relations' hospitality on release.

5. He was anxious to be certified. The habitual criminal malingers insanity to get transferred from prison to an asylum at times. The prisoner was not of this class, however, and the desire to be sent to an asylum at the end of a sentence instead of being released, apart from such, always suggests mental disorder.

6. He was a stranger, unknown in the district where the offence was committed, and could easily have got away. Instead he gave himself up to the police. A destitute man sometimes commits and admits a trivial crime to get arrested and the shelter of a prison, preferring it to that of a workhouse. A man wanted in one district for a serious crime may commit a trivial offence elsewhere to get arrested, thinking he may hide in prison. An offender sometimes confesses to a crime when he sees no opportunity of escape, hoping by so doing eventually to receive a more lenient sentence, or he may confess to a crime when drunk. Recently a man may commit a crime and admit it to get into prison to avoid military service. In this case the prisoner was not destitute, he had money on him when arrested, a home, and work to go to; he was not wanted for any offence in any other district; he was not drunk; he could easily have got right away and then would have required no leniency; finally, war had not been declared at the time. None of the ordinary reasons for confessing a crime were applicable in his case.

It does occasionally happen that a man commits a crime and informs the police, or courts arrest, when he feels he requires protection from himself—a melancholiac subject recently under my care did this as he was afraid of committing suicide unless he was under restraint. Taking all the above facts into consideration, the account that the prisoner gave of the offence and of his impulses was considered to be genuine.

When a person is charged with a serious offence such as murder, and the evidence in the hands of the prosecution is so overwhelming that there is no probability of avoiding a conviction, the counsel for the defence, unable to combat the facts, may, and not infrequently does, raise a defence of insanity. This is at times successful, even when there are no medical facts to support it. A favourite suggestion the prisoner's counsel offers the medical witness to accept is that at the time of the crime his client was suffering from an insane impulse. Homicide frequently results from impulsive acts due to the alcoholic insanities, paranoia, melancholia, mania, dementia, and epileptic states, and these have always

to be excluded before such a suggestion is refused. The case recorded is one in which violence appears to have resulted from a homicidal impulse in one of the forms of mental disorder less commonly met with in this connexion in the criminal courts. It is perhaps fortunate that all the characteristics of psychasthenic impulses are not likely to be assumed by a person desiring to feign insane impulses to evade the consequences of serious crime.

EXCISION OF THE RETRO-PHARYNGEAL GLAND,

WITH A SHORT ACCOUNT OF TWO CASES IN WHICH THIS OPERATION WAS CARRIED OUT.

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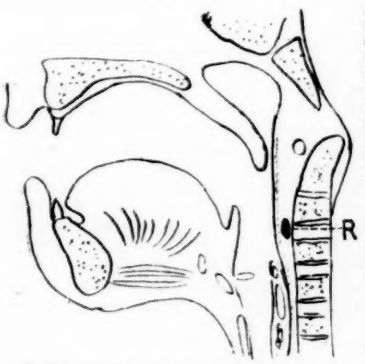
I HAVE performed the above operation on two occasions. The chief difficulty in removing the gland is its depth and near relationship to important structures.

It will be advisable to make a few preliminary remarks on retro-pharyngeal abscess, a condition frequently overlooked, especially in children.

Nearly all cases are due to suppuration taking place in the retro-pharyngeal lymphatic gland. (See diagrams.) There are two glands, one situated on either side of the middle line. Inflammation first occurs. This may be either acute or chronic (tubercular). Considerable swelling may take place, and clinical symptoms in rare instances will arise, before the formation of pus. (See Case 1.)

The abscess is, in the first place, confined to the gland; later, it bursts through the gland capsule. I have met with a tubercular abscess originating in the gland, where ultimately the abscess cavity extended from the base of the skull to the level of the thoracic inlet. In this case the larynx was markedly displaced forwards and to one side.

FIG. 1.



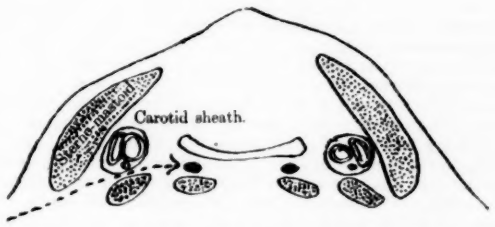
Sagittal section, showing position of retro-pharyngeal gland (R).

The question as to whether the pus is contained by the gland capsule or not is an important one in relation to treatment.

In dealing with acute suppuration the usual method is to open the abscess through the mouth; without doubt all tubercular abscesses should be opened from the neck. I would go a stage further and state that in some cases one ought not to be content with a mere opening and drainage of the abscess cavity, but when possible the diseased gland should be removed. (See Case 2.) I will now describe the procedure adopted in removal of the gland.

An incision is made along the posterior border of the sterno-mastoid. It starts behind the tip of the mastoid process and extends downwards for three inches or more. The deep fascia along the posterior edge of the muscle is divided. It is now possible to work inwards towards the pharynx between the sterno-mastoid on the one hand and the splenius capitis and levator anguli scapulæ on the other. (See diagrams.) The dissection is now carried further inwards by separating the carotid sheath and its contents from their posterior relations. Any enlarged glands met with should be removed. In the neighbourhood of the pharynx there may be some venous hæmorrhage. Great help can be obtained in the exposure of the gland by using strong retraction with a broad-bladed retractor. Without employing an undue amount of force the sterno-mastoid, carotid sheath, and even the larynx and pharynx can be pulled forwards. One of the risks is perforation of the mucous membrane. In order to avoid this the finger of an assistant in the pharynx is of great service. During removal of this gland get the assistant to push it downwards and outwards towards the wound. By counter-palpation and the use of a blunt dissector the capsule is defined. Undue force must be avoided, as the gland may contain an abscess. By keeping close to the gland capsule and working in conjunction with the assistant there should be no real danger of perforating the mucous membrane. After removal

FIG. 2.



Transverse section, showing the position of the retro-pharyngeal glands. The arrow shows the line of dissection.

of the gland the skin is united by interrupted sutures. A small gauze drain should be inserted, otherwise blood may be extravasated into the cavity.

A different class of case (see Case 2) is that in which a tubercular retro-pharyngeal gland has broken down, with resulting infection of the surrounding tissues. A large abscess cavity may be present, causing a marked swelling in the pharynx and possibly in the neck.

In such a case the abscess is first of all evacuated through the neck, or the sac of the abscess may in exceptional circumstances be removed, with its contents, entire. Once the abscess cavity has been incised the opening should be enlarged. The walls of the cavity are inspected, and the gland which is probably present and in a caseous condition is removed. The abscess wall should now be carefully curetted, or it may even be possible to excise it. Packing will generally be required. The rate of healing will depend on the thoroughness with which the disease has been dealt with. If the abscess is a very extensive one, as in the case referred to above, repeated aspiration from the outside, either with or without a modified dissection, would probably be the best mode of treatment, coupled with fixation of the head and treatment on general lines.

The following is a short account of the two cases where excision was carried out.

CASE 1.—Girl, aged 4. History of measles six weeks prior to admission. Ever since there had been increased difficulty in breathing, especially noticeable at night. There was a large swelling occupying the right side of the posterior pharyngeal wall and extending beyond the middle line. Operation was carried out shortly after admission to the London Hospital. When the swelling was palpated between two fingers it was so firm that I decided to remove it without ascertaining whether or not there was pus in its centre. The relief was immediate. Subsequent examination showed the gland to be of the inflammatory type; no evidence of tubercle was found, and there was no abscess. From the history and appearance I rather suspected tubercle. Union took place by first intention. In this case the formation of an abscess was forestalled by operation.

CASE 2.—Girl, aged 5. This patient had a large chronic retro-pharyngeal abscess which was opened in the usual way. Subsequently the pathological report confirmed the diagnosis of tubercle. An attempt was made to get the wound to heal from the bottom. Eventually the skin did unite, but shortly afterwards a swelling reappeared in the pharynx. The abscess was reopened, but, notwithstanding every effort, failure was the result; the abscess re-formed. I decided to operate a third time. Through a much longer incision I thoroughly opened up and inspected the abscess cavity. At the bottom of it a caseous retro-pharyngeal gland was discovered and removed by dissection. In addition, the walls of the abscess were gently curetted. Healing was somewhat slow, but within a month the patient was discharged from hospital cured, and there has been no recurrence of the condition.

Since writing the above I have operated on a boy, aged 7 years, where recurrence took place a year and a half after the simple opening of a tuberculous abscess from the outside. The gland in this case was partly calcified.

Harley-street, W.

THE PRINCIPLES OF THE TRANSFUSION OF BLOOD.*

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THE idea of transfusing blood from the healthy to the sick has appealed to the imagination of our profession for centuries, but no considerable progress was made until recent years, owing on the one hand to the difficulties which the operation presented, and on the other hand to the dangerous reactions which sometimes followed the more successful attempts. But the revived enthusiasm for transfusion during the last decade in America, France, and Germany has finally established its value upon a sound experimental and clinical basis, and it is remarkable that the subject has received so little attention in this country. The whole of Europe has been preoccupied, however, during the last three years, and I may mention, therefore, that transfusion has been successfully employed in the treatment of various kinds of anæmia and in the arrest of spontaneous hæmorrhage, whilst in combating serious infections and certain toxæmias, such as the toxæmias of pregnancy, promising results have been obtained.

How far the important factors of the blood concerned in achieving these various results reside in the serum it is not yet possible to say. So far as disintoxication and immunity are concerned transfusion may be merely a convenient method of transferring healthy or immune serum to the patient, and with the manifest domain of serum therapy I do not propose to deal. But blood therapy is still in its infancy; it could not be properly tested until an elaborate technique had been perfected and certain accidents liable to result from the chance admixture of different bloods had been excluded, and so with the remedy in our hands we have yet to learn exactly when and in what doses to use it.

Selection of Cases.

The most obvious application of transfusion is to the treatment of anæmia, but there are as yet very few guides to the selection of suitable cases. The advantage of transfusion in the case of patients who have been rendered anæmic by recent hæmorrhage is sufficiently clear; but it is probable that the average existence of the transfused cells in the circulation of the recipient is not longer than 10 days even under the most favourable conditions, and therefore in cases of anæmia due to other causes the added blood, although it may serve to tide over a crisis, can do no permanent good unless blood formation is stimulated or blood destruction diminished in the patient's own body.

That an increased activity of the bone marrow frequently follows transfusion is demonstrated by the fact that the blood count usually rises with a simultaneous increase in the number of reticulated red cells. But when the condition of the peripheral blood indicates a hypoplasia of the bone marrow the only method of determining whether increased blood formation will result from transfusion is to transfuse and see. The following case is probably an example of simple stimulation of the bone marrow.

CASE 1.—The patient, a female aged 11 years, was admitted to St. Bartholomew's Hospital under the care of Dr. Morley Fletcher, suffering from a severe anæmia which had followed an attack of diphtheria eight months previously. No other cause than a simple hypoplasia of the bone marrow could be found to account for the anæmia, and as a result of the first six weeks' treatment the red cell count rose from 925,000 to 1,330,000 per c.mm., and the hæmoglobin from 18 to 31 per cent. The patient then received 20 c.c. of blood from the house physician, and in 12 days the blood showed 1,580,000 red cells per c.mm. and 45 per cent. hæmoglobin. 150 c.c. of blood were then transfused, and during the next 17 days the red cells rose to 3,000,000 per c.mm. and the hæmoglobin to 63 per cent. Thereafter the anæmia diminished more slowly, until the patient went to a convalescent home.

In those diseases, such as pernicious anæmia, in which an excessive hæmolysis is known to occur, it is difficult to determine how far improvement following transfusion is due to increased cell production and how far it may be due to diminished hæmolysis. That the latter is one of the factors concerned might be expected on clinical grounds, for, as with spontaneous remissions, the patient becomes less yellow and toxic in appearance, fever diminishes, and a feeling of well-being which is out of proportion to the change in the condition of the blood is soon experienced.

The observations of Wilbur and Addis,[1] Robertson,[2] and others have shown that the variations in urobilin output in cases of pernicious anæmia not only serve as an index of blood destruction, but correspond to the remissions and relapses in the course of the disease, whether these be spontaneous or attributable to treatment; and Robertson[3] has shown that the remission following transfusion in a case of pernicious anæmia was accompanied by a corresponding diminution of urobilin excretion.

And, further, in some cases of pernicious anæmia the myeloid reaction becomes less evident as the patient improves after transfusion, suggesting that marrow hyperplasia is not wholly responsible for the improvement. This is illustrated by the following case:—

CASE 2.—Mrs. H., aged 42, suffering from pernicious anæmia with an enlarged spleen, was admitted to St. Bartholomew's Hospital under the care of Dr. J. H. Drysdale. Frequent examination of the blood suggested great hæmopoietic activity, 4000 to 6000 normoblasts and 100 to 400 megaloblasts per c.mm. being constantly present, but in spite of all treatment the anæmia steadily increased, until, three months after admission, the blood showed 429,000 red cells per c.mm. and 19 per cent. hæmoglobin. At this stage the patient, who had developed bronchitis, appeared to be moribund, but after receiving 250 c.c. of blood from her husband she showed a rapid and remarkable clinical improvement. During the next five weeks the blood count rose to 2,550,000 per c.mm. and the hæmoglobin to 66 per cent., while the nucleated red cells steadily disappeared from the peripheral blood. The patient was then transfused again and she improved still further, the red cells reaching 3,850,000 per c.mm. and the hæmoglobin 83 per cent. There were signs of relapse before she left the hospital at her own request 13 months ago, but it is now more than two years since the onset of the disease, and she is still able to look after her own home.

The ultimate prognosis in any case must depend upon the power of reaction in the bone marrow, and this, so far as I know, is only to be determined by trial. I have transfused 9 cases of pernicious anæmia, 8 of whom were selected because they were making no progress or were steadily becoming worse under other methods of treatment, the ninth being chosen because her condition was regarded as too serious to justify a trial of other methods. Of these 9 cases, 4 showed very marked improvement, 3, of whom 2 are still under treatment, showed definite but less marked improvement, 1 was merely kept alive for several weeks, and 1 derived practically no benefit. So far as these cases were concerned, the age of the patient, the duration of the disease, and the condition of the bone marrow as indicated in the peripheral blood proved to be the best guides to the progress subsequent to transfusion; but in some cases the results far exceeded expectation, while in others they were disappointing.

Selection of Donors.

The donor should be a healthy adult and the loss of such amounts of blood as I have generally used (250 c.c.) is never felt. In America larger quantities, even up to 1800 c.c., have been taken, and although such loss must debilitate the donor, there is probably no objection to taking as much as 500 c.c. at one time.

McClure[4] has recently recorded the transmission of syphilis from donor to patient. The donor, who had denied all possibility of infection, had a primary sore at the time of operation, and six weeks later both the donor and the patient, who was suffering from pernicious anæmia, simultaneously developed secondary eruptions. It seems unlikely that syphilis would be transmitted by a donor who, on careful examination, showed no signs of disease, but it is desirable that a Wassermann reaction should be done on the blood if time and facilities permit. In most cases, however, the donor is a relative or friend of the patient and he may be expected to answer questions frankly if the danger involved is explained to him. McClure also reports the transmission of malaria from a donor in whom the disease was quiescent to a patient in whom it flared up. But these two cases are the only instances I can find of the transmission of disease.

* A paper read at the Section of Therapeutics and Pharmacology of the Royal Society of Medicine on Feb. 20th, 1917.

If the prospective donor is found to be healthy his blood should be tested with that of the patient for iso-agglutinins and iso-hæmolysins. Landois,[5] in 1875, was the first to recognise the incompatibility of certain bloods, and Landsteiner,[6] in 1901, divided individuals into three groups according to the iso-agglutinative properties of their bloods. In 1910 Moss[7] recognised a fourth group, and the accompanying chart shows the reactions of the various groups.

CHART 1.

Group.	Serum agglutinates.	Corpuscles agglutinated by—
I.	Nil.	II., III., and IV.
II.	I. and III.	III. and IV.
III.	I. and II.	II. and IV.
IV.	I., II., and III.	Nil.

Chart 2 shows the result of testing together 12 specimens of blood. The first person belongs to Group I. and possesses no agglutinins, but his corpuscles are agglutinated by the serum of all the persons in other groups. The next four persons belong to Group II., the sixth to Group III., and the last six to Group IV. It should be noted that the fourth person (No. 4) slightly agglutinates the corpuscles of someone belonging to the same group, and it may be noted, too, that two of the specimens belonging to different groups, one in Group II. (No. 3), and one in Group IV. (No. 9), are from brothers. The technique employed in making these tests was that described by Dudgeon and Wilson.[8]

CHART 2.

CORPUSCLES.

SERUM.	1 T. B. B.	2 A. E. S.	3 A. R. D.	4 B.	5 L.	6 N. F. S.	7 V.	8 A. M.	9 E. G. D.	10 H. S. B.	11 T.	12 C. S.
1	—	—	—	—	—	—	—	—	—	—	—	—
2	a	—	—	—	—	A	—	—	—	—	—	—
3	A	—	—	—	—	AA	—	—	—	—	—	—
4	A	—	—	—	a	AA	—	—	—	—	—	—
5	AA	—	—	—	—	AA	—	—	—	—	—	—
6	AA	AAA	AA	AA	AA	—	—	—	—	—	—	—
7	AA	AAAA	AAA	AAA	AAA	AA	—	—	—	—	—	—
8	AAA	AAA	AAA	AA	AAA	AAA	—	—	—	—	—	—
9	AAA	AAAA	AAA	AAA	AAA	AAA	—	—	—	—	—	—
10	AAA	AAA	AAA	AAA	AAA	AAA	—	—	—	—	—	—
11	AAAA	AAAA	AAAA	AAAA	AAAA	AAA	—	—	—	—	—	—
12	AAAA	AAAA	AAAA	AAAA	AAAA	AAA	—	—	—	—	—	—

CHART 3.

CORPUSCLES.

SERUM.	1 A. E. S.	2 Mr. H.	3 A. R. D.	4 R. M.	5 Mrs. H.	6 N. F. S.	7 L. J. B.	8 N. H.	9 C. S.
1	—	—	—	—	—	a	a	—	—
2	—	—	—	—	a	a	A	—	—
3	—	—	—	—	—	AA	AA	a	—
4	—	—	—	—	a	AAA	A	a	—
5	—	—	—	—	—	AAAA	AAAA	A	—
6	AAA	AAA	AAA	AAA	a	—	—	—	—
7	AAA	AAA	AA	AA	—	—	—	—	—
8	AAA	a	AAA	A	a	—	—	—	—
9	AAA	AA	AAA	AAA	A	A	AA	AA	—

— = no agglutination. a = very slight but definite agglutination. A = well-marked agglutination. AAAA = complete agglutination.

The four groups described have been supposed to be sharply defined, so that all bloods falling into one group are mutually compatible, while they are incompatible with all bloods in the other groups. It will be seen that if this were true the group to which any blood belonged could be fixed by testing it against a known blood belonging to either Group II. or Group III. My own observations, however, show that a certain amount of overlapping of the groups occurs, and this is well illustrated by Chart 3, in which the first five persons belong to Group II., the next three to Group III., and the last to Group IV. The fifth person (No. 5) belongs to Group II., so that her serum agglutinates the corpuscles of the persons in Group III., but has no influence upon those of her own group. The corpuscles in this case, then, should be unaffected by the sera of Group II. and agglutinated by the sera of Group III.; but it was found that two of the Group II. sera produced slight agglutination, while of the Group III. sera one failed altogether to agglutinate, and the other two acted no more strongly than the sera of Group II. It is generally admitted, moreover, that different bloods contain different amounts, as well as different kinds, of agglutinin, and that the amount of agglutinin in a single blood may vary slightly from time to time. That these variations may be sufficient to obscure the true grouping of a particular blood is illustrated by the case of patient No. 9, who was transfused from the donor No. 8. (See Chart 3.)

CASE 3.—On Nov. 1st, 1915, a patient, C. S. (No. 9, Chart 3), suffering from pernicious anæmia under the care of Dr. A. Feiling in the Metropolitan Hospital, received 250 c.c. of blood from N.H. (No. 8) after the usual tests had shown the absence of agglutinins and hæmolysins. The red cells were immediately raised from 625,000 to 810,000, but a week later they had fallen to 600,000, and the patient appeared to have derived no benefit from the operation. There was, however, no unfavourable reaction of any kind. On Nov. 22nd the operation was repeated. When the patient had received about 20 c.c. of blood he complained of feeling faint, and became even more pallid. As the transfusion continued his pulse became very feeble, he retched and vomited violently, his face became distinctly puffy, and his skin was covered with cold sweat. When he had received about 100 c.c. he complained of pain in the sacral region, and this quickly became so intense that he could only be quieted with morphia. 250 c.c. of blood were given, and a few hours afterwards the patient began to pass hæmoglobin in the urine. Twelve hours later he was a deep yellow colour and slightly œdematous all over, but he said that he felt much better. The hæmoglobinuria ceased after 36 hours, the yellow colour and the œdema disappeared in the course of about three days, and the patient's general condition steadily improved until six weeks later, when he left the hospital for domestic reasons, he had just over 3,000,000 red cells per c.mm. and 75 per cent. of hæmoglobin.

[It is interesting to note the improvement which followed transfusion in the foregoing case in spite of immediate hæmolysis of the transfused blood.]

Subsequent examination of the blood revealed the fact that the patient belonged to Group IV. and the donor to Group III., but apparently the corpuscles of the latter were not very susceptible to agglutination, and the titre of the patient's serum at the time of the first transfusion must have been so low as to give no agglutination by the ordinary tests It appears, therefore, that a single examination is not always sufficient to establish the compatibility of two bloods on all future occasions.

There is no evident familial grouping of bloods. I have already remarked that two of the bloods in different groups in Chart 2 belong to brothers, and I have observed such differences in several other cases, but unfortunately opportunity has not permitted a further study for determining whether similarity and dissimilarity of blood reactions accompanies other physical features.

The group to which the blood belongs does not appear to be determinable at birth. Cherry and Langrock[9] recently examined the blood of 34 infants, each against the blood of its own mother, without finding a single instance of agglutination. Hektoen[10] states that the reaction of the child's blood is evident by the sixth year, and other observers have found the grouping to be apparent even before this, but it is useful to know that an infant may be safely transfused from its own mother without performance of the usual tests.

Hæmolysins are found less frequently than agglutinins, and it is established that they never occur without agglutinins. Ottenberg, Kaliski, and Friedman[11] experimenting on dogs found that hæmolysins were sometimes developed in the serum after repeated transfusions of agglutinable cells, but that they were never developed by the transfusion

of non-agglutinable cells. It is possible that the patient in Case 3 developed a hæmolysin, or more hæmolysin and more agglutinin, as a result of the first transfusion.

It has been noted by several observers that, as in Case 3, hæmolysis following transfusion may be a much more violent phenomenon than hæmolysis of the same blood *in vitro*, and even a slight degree of agglutination of the proposed donor's corpuscles should be viewed with suspicion, for the danger is not one to be lightly regarded. Bernheim,[12] collecting 800 reported cases of transfusion, found 15 instances of macroscopic hæmolysis. Among these there were four deaths, three in cases in which no preliminary tests had been made and one in which it had been found that the donor's cells were slightly agglutinated by the patient's serum. There can be no doubt that a much higher proportion of disasters would have occurred but for the safeguard of preliminary tests.

Moss[7] showed that antihæmo'ysins are always present in blood the red cells of which are hæmolysed by the serum of another individual. The presence of the antihæmolysin and the dilution of the transfused blood by the blood of the recipient probably explain the fact that it is less dangerous to introduce a blood containing hæmolysins for the patient's corpuscles than to introduce one of which the red cells are destroyed by the patient's serum.

I know of no immediate phenomena resulting from the introduction of cells which are agglutinated without being hæmolysed by the recipient, nor, indeed, is it known whether iso-agglutination occurs in the circulation. On one occasion, in the absence of a more suitable donor, I gave a patient 100 c.c. of blood the red cells of which he agglutinated. He was not benefited, but, on the other hand, he exhibited no unfavourable reaction. Nevertheless, it is undesirable to run risks by employing a donor belonging to a different group to the patient except in cases of extreme urgency, and then the risk will be least if the donor belongs to Group IV., so that his own cells cannot be agglutinated or hæmolysed. Or if, in such cases, the grouping of the bloods of both donor and recipient is unknown and testing is impracticable, a small preliminary transfusion should be done half an hour before the main mass of blood is transferred, so that gross incompatibility may be recognised in time.

Reactions following Transfusion of "Compatible" Blood.

Even in those cases in which both donor and recipient have been found to belong to the same group febrile reactions are apt to follow transfusion. Among my own cases rigors have occurred in about 10 per cent., fever in about 25 per cent., and these figures agree closely with those published by most observers. The rigors have followed within half an hour of the transfusion, and the temperature in the febrile reactions, apart from the sudden rise accompanying the rigor, has usually reached a maximum of 102° to 103° F. on the following day, subsiding within 48 hours.

It has been suggested that the fever is due to incipient coagulative changes in the transfused blood, and some support is lent to this view by the fact that rigors are common after intravenous injection of defibrinated blood. Moss[13] noted rigors and transient fever in the majority of 75 cases which he treated by this method without other untoward results. But I have noticed a minute trace of coagulum remaining in my apparatus after transfusion on several occasions, although no reaction followed in the patient; and Lindeman,[14] in a series of 108 transfusions, observed that febrile reactions with or without rigors occurred much less commonly when the donor was a relative of the patient than when he was an "alien," and this although incompatibility due to agglutination or hæmolysis had been ruled out in every case.

In some of my cases in which the patient has been transfused twice from the same donor a febrile reaction has followed the first transfusion but not the second; in other cases no reaction followed on the first occasion, while the second was succeeded by fever. But only in one case have the symptoms been at all alarming

CASE 4.—The patient, aged 38 years, suffering from pernicious anæmia, was admitted to St. Bartholomew's Hospital under the care of Dr. Morley Fletcher. During a previous admission I had twice transfused him from his brother with marked benefit, the red cells rising from 500,000 to 3,800,000 per c.mm. and the hæmoglobin from 16 to 86 per cent. during the course of seven weeks. He was now transfused with 275 c.c. from another donor, who had made a long journey for the purpose and whose blood had been found to be compatible a week previously. Within 15 minutes of the completion of the operation the patient had a rigor and his temperature rose steadily until it reached 105° F. three hours later. He became delirious and on the day following the operation the yellow colour of his skin was much deeper than before, but the blood serum showed no trace of hæmoglobin. The most alarming symptom, however, was complete anuria, which lasted for 43 hours after the transfusion. The urine passed subsequently contained an excessive amount of urobilin, but not an unusual amount for a case of pernicious anæmia. The temperature fell slowly, reaching normal three days after the transfusion. But the subsequent rise in the number of red cells and the amount of hæmoglobin was slight and transient, and the patient is about to be transfused again. Unfortunately, owing to the remoteness of the donor, I have been unable to repeat the agglutination tests in this case.

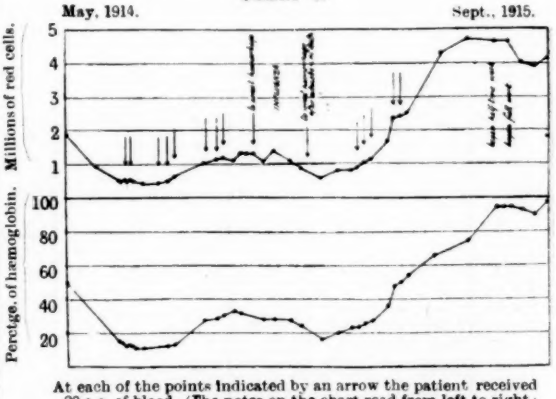
There are thus certain reactive phenomena which we cannot at present avoid, although the frequency of their occurrence is said to be diminished by the choice of close relatives of the patient as donors. The chief dangers may be eliminated by careful testing for agglutinins and hæmolysins, but it may prove desirable to investigate other factors of which we as yet know nothing, not merely for the sake of avoiding accidents, but also to determine whether a given donor is likely to afford the maximum benefit in a particular case.

Dosage.

The amount of blood to be transfused depends upon the purpose of the transfusion, and in cases in which a considerable transfusion is proposed without the immediate object of increasing the red cell content of the blood it may be advisable to bleed the patient before the operation in order to avoid overloading the circulation.

For the arrest of spontaneous hæmorrhage small doses of blood, even 20 c.c., will sometimes suffice, whereas in the treatment of acute anæmia due to hæmorrhage the blood lost should be replaced as fully as possible, with due regard to the danger of dilating an enfeebled heart. But great uncertainty exists as to the optimum dosage in the treatment of chronic anæmias. There is a tendency now to the belief that large single transfusions are less beneficial, so far at least as stimulation of the bone marrow is concerned, than are small or moderate repeated transfusions, and I notice that the results which I have obtained in cases of pernicious anæmia with 250 c.c. doses compare favourably, even after a single transfusion, with those reported in America after such massive doses as 1000 c.c. or more. Careful and prolonged trial of different doses administered at various intervals is necessary before more can be said as to the best routine to employ, but the following case is interesting as illustrating the apparent value of very small doses.

CHART 4.



At each of the points indicated by an arrow the patient received 20 c.c. of blood. (The notes on the chart read from left to right: (1) to arrest hæmorrhage; (2) influenza; (3) to arrest hæmorrhage after extraction of teeth; (4) began half-time work; (5) began full work.)

CASE 5.—The patient, aged 38 years, was admitted to the Metropolitan Hospital on May 14th, 1914, under the care of Dr. Langdon Brown, suffering from hæmorrhage from the nose and gums, extensive purpura, spontaneous bruising, and hæmaturia. No cause for the disease could be

discovered. The symptoms were of sudden onset, and the epistaxis and bleeding from the gums persisted steadily after admission in spite of treatment. After two months the patient's blood was reduced to under 500,000 red cells per c.mm. and 12 per cent. hæmoglobin. At this stage small injections of normal blood were commenced, 20 c.c. being administered by syringe at intervals, as shown on the chart. The course of the anæmia will be seen. Progress was interrupted by a recurrence of spontaneous hæmorrhage, by an attack of influenza, and by a profuse hæmorrhage after extraction of several teeth, but a year later the patient returned to work with a red cell count of 4,700,000 per c.mm. and 95 per cent. hæmoglobin. He has remained at work ever since and his general health is good, but the blood, although it contains 100 per cent. of hæmoglobin, shows at present only 3,500,000 red cells per c.mm.

Methods of Transfusion.

The first consideration is to prevent coagulation of the transfused blood, the second to determine the amount which passes from donor to patient. The methods which have been employed may be classified as follows:—

I. Direct. By anastomosis of vessels, with or without a cannula.

II. Indirect. (i.) By syringe: (*a*) syringe transferred from needle in vein of donor to needle in vein of recipient; (*b*) syringe with two-way tap leading to veins of donor and recipient. (ii.) By use of a receiver: (*a*) with paraffin lining; (*b*) with addition of an anti-coagulant.

I have not attempted vascular anastomosis. The method is advantageous in avoiding exposure of the transfused blood, but it requires great surgical skill and the damage done to the blood-vessels employed is a serious drawback so far as the donor is concerned, while it may prove disadvantageous to the patient if the operation has to be several times repeated. And, further, no exact determination of the amount of blood transfused is possible.

The syringe method, popularised by Lindeman, requires two skilled operators, several other assistants, and a large number of expensive syringes which are easily broken. But given these various requirements the method is a good one. The mechanical difficulties in connexion with the two-way tap are very great. I have had several taps made, but finally discarded them in favour of a method employing a receiver. The paraffin-lined apparatus of Satterlee and Hooker [15] requires elaborate precautions, and coagulation is very liable to occur, whereas the use of an anti-coagulant renders transfusion a simple matter. Satterlee and Hooker [16] have employed hirudin to prevent coagulation with satisfactory results, but it is difficult to guarantee the absence of toxic substances in the hirudin, and serious symptoms have occurred in some of the later cases in which it has been employed.

Two years ago Weil [17] published his experiments on the transfusion of exsanguinated animals with citrated blood, and since then I have employed sodium citrate in 29 transfusions. At the same time it has been very extensively used in America and its convenience is generally recognised, although some workers assert that it has a toxic action when used in adequate doses. All the clinical as well as the experimental evidence is opposed to this assertion. Weil recommended a 10 per cent. solution of the citrate, which is sufficiently nearly isotonic with the blood to avoid causing hæmolysis, and one part of this almost always prevents coagulation when mixed with 10 parts of blood. Smaller quantities of citrate will often suffice, but the higher proportion has, so far as I can determine, no disadvantages. Salant and Wise [18] have shown that the toxic dose of sodium citrate in dogs and cats is far greater than this, and Weil states that the coagulation-time of the recipient is actually lowered by transfusion of citrated blood. It may be questioned whether the citrate, by merely inhibiting the final stage in the process of coagulation, masks the preliminary stages which have in themselves rendered the blood toxic, but even if this is so, the dangers involved are not great and the value of the transfused blood is not evidently diminished.

The apparatus which I employ sucks the blood from the vein of the donor into a glass receiver, while a graduated stream of 10 per cent. solution of sodium citrate mingles with the blood as close as possible to its exit from the vein. When the required amount of blood has been withdrawn suction is stopped, the stream of citrate solution is cut off, the needle is removed from the vein of the donor and introduced into the vein of the patient, and the blood is gently pumped from the receiver. By this method the time employed in withdrawing and transferring 250 c.c. of blood is usually about 15 minutes.

Summary.

1. Transfusion has been successfully employed in the treatment of various kinds of anæmia and in the arrest of spontaneous hæmorrhage. It has also yielded promising results in cases of serious infection and in certain toxæmias.

2. The ultimate prognosis in cases of anæmia depends upon the power of reaction in the bone marrow, and this can only be adequately determined by observing the results of treatment.

3. In cases of pernicious anæmia both increased red-cell production and diminished red-cell destruction may result from transfusion.

4. In cases of pernicious anæmia the age of the patient, the duration of the disease, and the condition of the bone marrow as indicated in the peripheral blood have hitherto proved to be the best guides to the progress subsequent to transfusion.

5. The optimum dosage for transfusion is not yet determined, but it is probable that moderate repeated doses are preferable to large single doses in the treatment of chronic anæmias. Very small doses may sometimes be of value.

6. The donor should be a healthy adult with negative Wassermann reaction. The serum of the donor should not agglutinate the corpuscles of the patient, and the serum of the patient should not agglutinate the corpuscles of the donor. Agglutinins should be excluded by tests done immediately before the transfusion, and a single examination is not sufficient to establish the compatibility of two bloods on all future occasions. If agglutinins are absent, hæmolysins will also be absent.

7. If there be great urgency and testing of the blood of patient and donor be impracticable, a small preliminary transfusion should be done half an hour before the main mass of blood is transfused, so that gross incompatibility may be recognised in time.

8. Febrile reactions occur after about 25 per cent. of transfusions, even though the bloods of donor and patient have been proved to be "compatible." Rigors occur in about 10 per cent. of the cases.

9. It may prove desirable to investigate the blood of donor and patient with regard to factors of which we as yet know nothing, not merely for the sake of avoiding accidents, but also to determine whether a given donor is likely to afford the maximum of benefit in a particular case.

10. The indirect method of transfusion, employing a glass receiver and sufficient sodium citrate to prevent coagulation of the transfused blood, is simple and involves no special dangers.

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THE SWEDISH ROYAL ACADEMY OF SCIENCE.—Sir William Crookes, O.M., F.R.S., has been elected an Honorary Foreign Member of this Academy.

ALEXANDRA NURSES AND MATERNITY HOME, DEVONPORT.—The annual meeting of the supporters of this institution, which is in connexion with the Soldiers' and Sailors' Families Association, Devonport, was recently held under the presidency of Mrs. F. B. Mildmay; there was a large gathering. The report stated that during 1916 the number of babies born in the home was 153, against 96 in 1915. In addition, the nurses had attended 620 midwifery cases and 417 general cases. Rear-Admiral J. de M. Hutchison appealed for subscriptions from friends of the Royal Navy. The financial statement was satisfactory.

THE TECHNIQUE OF THE PREPARATION OF CULTURE MEDIA CONTAINING ALBUMINOUS FLUIDS,

IN PARTICULAR FOR THE GROWTH OF THE MENINGOCOCCUS.

BY P. FILDES, M.B., B.C. CANTAB.,

ASSISTANT BACTERIOLOGIST TO THE LONDON HOSPITAL; WORKING ON BEHALF OF THE MEDICAL RESEARCH COMMITTEE AT THE ROYAL NAVAL HOSPITAL, HASLAR.

THE great advantage of the addition of albuminous fluids to media for furthering bacterial growth is, of course, well known, but the serious objection to their routine use has been the difficulty in sterilising them without altering their physical or nutritive properties. The alternative of collecting them in a sterile manner may be applied to blood or serum in small quantities from man or with special facilities in large quantities from large animals, but in the case of ascitic fluid the collection of a sterile specimen is notoriously difficult.

It may be assumed that the activity displayed in the past two years in the production of media for the growth of the meningococcus has some relation to the difficulty in obtaining sterile body fluids in large quantities, since it has long been known that blood agar, serum agar, and various preparations of ascitic fluid are more or less satisfactory for the growth of this organism.

When first interested in the preparation of sterile serum an attempt was made to reinforce the action of a volatile antiseptic by the application of slight heat. Dr. L. Rajchman and I thus published a note upon ether associated with mild heat, as suggested by Ori. In our method 3 per cent. of ether was added to the serum and the whole enclosed in a tightly stoppered bottle, which was placed in a water-bath for one hour at 45° C. and then 24 hours at 37° C.

By means of this method large quantities of serum agar have been prepared. It has, however, certain disadvantages. Sometimes a batch of serum is found not to have been sterilised, and when such refractory bacteria are present it is necessary to continue the heating in the incubator for days or weeks. Again, all bacteria are not inhibited by the ether in the cold, and some may grow in the bottles stored in the cupboard if they have been contaminated during any manipulation. For these reasons I tried the effect of chloroform in place of ether.

Chloroform has been used in the preservation of sterile serum for years and also in the sterilisation of such materials. In my hands, however, for the latter purpose it had proved unsatisfactory. If sterilisation was to be successful, it required at least months to effect. It, however, seemed probable that the application of slight heat which was insufficient to alter the delicate proteids even of whole blood might nevertheless greatly increase the bactericidal action of chloroform. A trial was therefore made with 0·5 per cent. chloroform upon some contaminated serum in a tightly stoppered bottle at 45° C. One hour at this temperature in a water-bath was found to sterilise it completely without in any way altering its appearance.

Chloroform has now been in use for 12 months, and during this time all serum and ascitic fluid have been sterilised with it. It has also been adopted for sterilising and preserving hæmolytic and agglutinating sera. In view, however, of certain criticisms which the publication of the ether technique called forth, it may be desirable to mention that chloroform is only suggested as a *practical* method for preparing sterile serum for media. If serum is grossly contaminated with spores, it cannot be sterilised in one hour at 45° C. Slaughter-house blood is, however, not grossly contaminated with spores.

The sterilisation of serum.—The serum should be collected at a slaughter-house. The best animal to use is, of course, the horse, owing to the rapidity with which the corpuscles deposit, but for some time no horses have been available, and we have used ox blood. Unfortunately it is almost impossible to withdraw the serum from ox blood without the bulk of it being more or less heavily contaminated with corpuscles. We do not now attempt to get the serum absolutely free from corpuscles, but collect the whole as clear as possible and allow it to stand in the ice-chest in tall sterile jars about 2 in. in diameter. An efficient ice-chest must be used for this purpose, because it may be necessary for the serum to stand as long as 14 days before complete deposition has taken place.

The jars should be examined after five days, when the corpuscles will be about half deposited. The clear serum should now be removed with a pipette or slowly syphoned off. Great care must be exercised in order not to disturb the corpuscles.

The separated serum is now distributed in measured quantities (200 c.c.) into glass-stoppered bottles (the fit of the stopper must be perfect) or into larger glass bottles. If the bottles of serum are to be disturbed, for instance in transit, it is better to fill them for despatch from a large bottle, otherwise on arrival they will be found to be "muddy" from the shaking up of a slight deposit caused by excess of chloroform in the bottle. Chloroform is added to each bottle to make 0·5 per cent. A drop of sterile oil is next applied to the stopper to prevent sticking and a dust-cover is fastened tightly over it.

The bottles are placed in the water-bath at 45° C. for one hour, being shaken occasionally. When they have cooled, a sample may be removed and mixed with agar to test sterility. This tube should be incubated for at least 5 days before sterility is assumed. We have not yet met with a sample of serum which was not sterile after undergoing this process, and it is recommended as a quick and certain method. It does not, however, leave the serum always unchanged; if the serum is red from admixture of laked corpuscles the colour tends to turn brown and darken. When the serum is required for any purpose entirely unaffected by heat, sterility may be obtained readily by placing the bottles in the air incubator at 37° C. and shaking occasionally. After 24 hours they will in most cases be found to be sterile, and almost invariably after 2 days.

When sterilised the bottles of serum are stored in a cupboard. Before the material can be used as a medium the chloroform must be removed, and unless this is done correctly the removal may not be efficient. The best way is to pipette the serum off in measured quantities (50 c.c.) into 200 c.c. flasks, and then to heat these flasks up to 55° C. rapidly and place them under the receiver of a pump. When a partial vacuum has been obtained, the receiver containing the flasks is shaken and the chloroform then boils off. If an exhaust pump is not available the flasks may merely be heated to 55° C. and thoroughly shaken. This, of course, will often soil the wool plug, but will not necessarily lead to bacterial contamination if non-absorbent wool is used. The serum is now ready to incorporate into a culture medium.

The chloroformed serum stored in bulk is very easy to handle and is not susceptible to contamination during the removal of samples. It is absolutely clear, but often a slight deposit collects upon the bottom of the bottle; this deposit is, however, compact and is not disturbed during the process of pipetting.

The sterilisation of ascitic fluid.—The ascitic fluid is collected from the patient into a large glass bottle and this is allowed to stand in the ice-chest for a day or two to permit the formation of any clot or gross deposit. The fluid is then decanted or filtered through glass wool. Ascitic fluid varies considerably in its reaction to litmus and thus should be brought to a slightly alkaline or neutral reaction with acid or alkali. The fluid is then distributed into stoppered bottles and chloroformed, the further treatment being exactly the same as for serum.

Ascitic fluid is always more susceptible to the formation of flocculent deposits during sterilisation than serum and these deposits are more easily disturbed during the removal of samples.

The sterilisation of blood.—Blood is collected at the slaughter-house in the same manner as serum, but instead of being allowed to clot it is defibrinated by stirring with a large wooden stick wrapped in gauze, the whole being previously sterilised.

In order to sterilise blood by the heat-chloroform method it is necessary to lake it before adding the chloroform. It is found that the bactericidal action of chloroform is quite inhibited when the fluid contains matter in suspension, and thus even 1 per cent. chloroform will not sterilise unlaked blood. For laking we have used both ether and distilled water and have found the latter preferable. An equal part of distilled water is added to the blood and the mixture distributed as in the case of serum. 0·5 per cent. chloroform is then added and the bottles well shaken.

While serum and ascitic fluid may be sterilised at 45° C., this temperature is not permissible in the case of blood, since a heavy precipitate forms after about 30 minutes. The bottles are therefore placed in the air incubator at 37° C. and constantly shaken. After 24 hours a sample is taken to test for sterility, and pending the result the bottles are not returned to the incubator, because the longer blood is heated the darker does the colour become. From the point of view of transparency in the subsequent medium the red colour of the blood should be retained as much as possible. Twenty-four hours is invariably long

enough to ensure sterility, the blood itself being practically sterile at the beginning.

This sterile blood is much more susceptible to the action of heat than serum; when, therefore, it is subsequently mixed with agar care must be taken that it is not heated above 55° C. and for as short a time as possible.

The method of preparing media with sterile albuminous fluids.—The media to which this method has been applied mostly are as follows:—

1. *Ascitic agar.*—Ordinary lemco- (or meat-) peptone agar is prepared containing 2½–3 per cent. of agar. It is measured into 200 c.c. flasks in quantities of 150 c.c. and autoclaved. When required for use a flask of agar is melted in the steamer and treated in one of two ways:—

(*a*) It is poured into a sterile distributer maintained in a water-bath at 50° C. and a flask of ascitic fluid (50 c.c.) is added. The contents are mixed and then "tubed" through a "hooded" pipette to avoid contaminations.

(*b*) The flask of ascitic fluid may be poured directly into the melted agar in its flask and mixed and then rapidly poured either into Petri dishes or tubes. This latter method has the advantage of reducing the heating of the medium to a minimum, but requires more care.

It is important to mix the agar with the ascitic fluid (or serum) at a temperature as low as possible, since this results in a more transparent medium. This ascitic agar is as clear as ordinary agar, and has been found to grow the meningococcus admirably from the throat. Our samples have all contained blood, and this, together with nasal mucus, probably accounts for the excellence of the growth. In subculture this medium does not produce growths so profuse as serum agar.

2. *Serum agar.*—This medium is prepared in exactly the same way as ascitic agar, using serum. It also is no more opaque than ordinary agar. The meningococcus grows upon this medium in the great majority of cases, but sometimes inexplicably fails.

3. *Blood agar.*—An excellent transparent blood agar may be prepared by adding 25 per cent. of the sterile laked blood to 2½–3 per cent. agar. The finished medium thus contains 12·5 per cent. of blood.

4. *Blood-serum agar.*—This is the medium which we use for all routine work with the meningococcus except the primary cultures from throats. It contains a small quantity of laked blood, sufficient to stimulate growth but hardly sufficient to make any difference to the colour. We use 1 part of blood in 400 of medium, 1 c.c. of the laked blood (diluted 1 in 2) being added to each 50 c.c. flask of serum, or the blood may be added in bulk to the bottle of serum before this is distributed into flasks. In order to reduce the colour we use neither lemco nor meat in the preparation of the agar, merely salt solution and peptone (Morson's).

The growth of the meningococcus upon this medium is profuse and one "slope" is sufficient to supply emulsion for carrying out, for instance, a set of agglutination tests with five different sera. Other delicate pathogenic organisms, such as pneumococci and streptococci, also develop abnormally large colonies upon it.

A CASE OF

SHELL-WOUND OF THE HEART CAUSING COMPLETE HEART-BLOCK.

BY C. EDGAR LEA, M.D. VICT., M.R.C.P. LOND.,

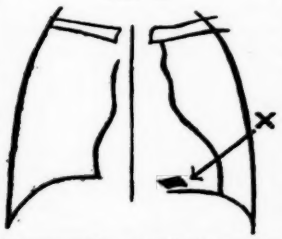
LATE CAPTAIN, R.A.M.C.; HONORARY PHYSICIAN, ANCOATS HOSPITAL, MANCHESTER.

I AM indebted to Captain J. Morley, R.A.M.C. (T.), for the opportunity of seeing and recording this unique case, which presents problems alike in regard to causation and treatment.

The patient, a soldier, aged about 20, received a wound over the heart region on July 1st, 1916, probably by a portion of shrapnel. I saw him first in December, 1916. The wound had completely healed, but there was some shortness of breath on exertion. He never had any syncopal attacks of any kind; nor had he any pain. The heart's dullness was increased to the left and probably to the right. There was a soft systolic murmur over the apex. The rhythm was regular; the rate slow, 40 per minute. This did not vary with effort. Previous X ray examinations had shown the presence of the fragment in the immediate vicinity of the heart, and he was admitted with a view to considering the possibility of operation for its removal. A screen examination which I made showed that the fragment was in the position shown in Fig. 1. It distinctly moved in an upward direction with the ventricle at each systole. It was probably in the myocardium or in the substance of the pericardium, which was probably adherent over this site. The heart, too, appeared much larger than had been suspected from percussion. Immediately after the screen examination an electro-cardiographic curve was gained (Fig. 2), typical of complete heart-block. The auricles (rate 96) are beating quite independently of the ventricles (rate 40).

The notes are, unfortunately, very brief, owing to the exigencies of military conditions, and the patient was only under my personal observation for a few days; nor have I been able to get any notes either previous or subsequent to this occasion. He has been lost sight of entirely.

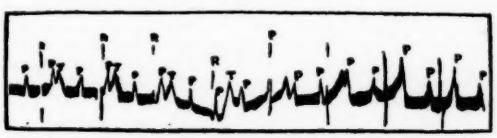
FIG. 1.



Diagrammatic, to indicate roughly the site of the fragment (×) situated near the diaphragm on the left side. It moves synchronously with the heart at each systole.

Two problems are presented in this case: What is the relation of the wound to the blocking, and secondly, what treatment could be advised? As regards the first, there seems little reason to doubt that the heart-block was induced by causes immediately associated with the wound. He had up to the date of its reception been perfectly well, and so slow a pulse previous to this occasion would not have passed unnoticed. It is, we think, anatomically impossible for the bundle of His to have been directly damaged by the fragment, situated as it is in the very centre of the heart, whereas the fragment is on the outer aspect of the myocardium and nearer the apex than the base of the heart. The only explanation we can suggest is that the mechanical shock to the heart due to the wound caused at the same time a small hæmorrhage which implicated the auriculo-ventricular

FIG. 2.



Electrocardiographic curve showing typical complete heart-block. P = auricular systole; R T = ventricular systole.

bundle. It is a structure with a fairly good blood-supply, and it is embedded in tissues of some rigidity, which would offer, therefore, a relatively greater resistance to a mechanical blow.

As to treatment, medical measures are obviously of little avail. Atropine had no effect in relieving the block, and if one is right in considering the cause as traumatic, drugs such as potassium iodide could offer no satisfactory prospects. Operation would be equally helpless in removing the block. That in an ordinary case the fragment could be successfully removed we have little doubt; the war has shown this. But would a surgeon like to operate upon a case complicated, as this is, by a severe functional disorder? Though hitherto this patient had had no syncopal attacks, it by no means follows that such an event might not be induced under an anæsthetic. But here we have no experience to guide us; we have noted, however, that the intravenous injection of salvarsan, a relatively trivial affair, has been followed by rather startling symptoms in the few occasions in which it has been tried in cases of heart-block. And even were the fragment removed, it is doubtful whether the full functional efficiency of the myocardium, already seriously impaired as shown by the dyspnœa and the cardiac enlargement (neither condition necessarily associated with pure heart-block), would be restored or much alleviated.

Manchester.

SOUTH DEVON AND EAST CORNWALL HOSPITAL, PLYMOUTH.—The report read at the annual meeting, recently held under the presidency of Viscount Clifden, stated that during 1916 1672 in-patients and 1793 out-patients had been treated. The treasurer reported a year of "unprecedented financial anxiety," as the ordinary expenditure for the year exceeded the ordinary income by £3190, and the committee appealed for increased subscriptions so that the work of the hospital might not have to be curtailed for want of funds.

METABOLISM IN GOUT.

BY WILLIAM BAIN, M.D. DURH., F.R.C.P. LOND.

(*From the Physiological Laboratory, King's College, London.*)

Two early and important discoveries focussed the attention of the profession on the problem of the exact relationship of uric acid to gout. In the first place, Wollaston showed that a salt of uric acid was deposited in the tissues of many gouty patients; and, secondly, Garrod demonstrated that an increase of uric acid commonly occurred in the blood of such subjects. The issue raised was, and is, whether uric acid is the essential cause of the disease or merely an agent incidental to its pathology. An immense amount of work has been done to clear up the point, and although the effect of this and allied investigations has been to modify some current theories and to falsify others, no decision has yet been reached: the pathology of gout still remains hypothetical as regards its causative factor. Under these conditions further research off the beaten track seemed desirable, and this consideration led me to investigate the calcium metabolism in gout. It is well known that calcium is a regular ingredient of gouty deposits, and in some analyses of tophi I found that the murexide test failed to reveal the presence of uric acid. Before describing the methods, conditions, and results of the investigation it is advisable to state briefly what is known regarding the excretion of calcium in health and in some diseases.

General Considerations.

Calcium is taken into the organism in both inorganic and organic form. Its principal inorganic salts in food are the phosphate, sulphate, and carbonate. Organic combinations are believed to occur in milk, eggs, and vegetables. The absorption of calcium largely depends on the salts present; thus associated sodium chloride raises the absorption of calcium, and the latter is also affected by the phosphorus intake, because the formation of insoluble calcium phosphate may retard absorption. The precise needs of the human organism relative to calcium are still undetermined. E. Oberndorffer[1] puts the figure at 1·5 grammes per diem, whereas Bunge[2] gives 3·5 grammes as the required daily quantity. It is probably safe to say that a diet containing less than 1 gramme of calcium oxide per day is deficient in calcium. Widely different statements are made as to the calcium content of the blood under normal conditions. Bunge[3] puts it at 0·04 per cent. of calcium oxide, but others give figures as high as 0·27 per cent. No doubt the content is related to the amount in the diet, and doubtless the same is true in pathological conditions; Hirschler and V. Terray[4] found in a case of chronic endo-arteritis on a mixed diet 0·0051 per cent. of calcium oxide in the blood, which sank on a milk diet to 0·0027 per cent.

Of the total intake by far the greater part is voided with the fæces, only about 10 per cent. being excreted in the urine (Sherman).[5] In Vierordt's Tabellen (p. 237) the daily output of calcium oxide in the urine is given as 0·2 to 0·3 gramme. This is the average of several analyses. In osteomalacia there is a pronounced loss of calcium, and there is more calcium in the urine than in the fæces. On the other hand, in osteitis deformans a marked retention of calcium in the body occurs, and the proportion excreted in the urine is greatly diminished.[6] In wasting diseases the urinary calcium rises. It has been shown experimentally that the administration of soluble calcium salts, or of acids (such as lactic) which yield soluble calcium salts, increases calcium excretion via the kidneys.

Previous studies of metabolism in gout do not appear to have touched upon calcium as a factor, but, as already stated, have been mainly concerned with uric acid; and in relation to this substance Garrod's observation that there is an increase in the blood has been corroborated by other workers. Gudzent[7] found that the blood may contain as much sodium mono-urate as, or more than, it can hold in solution (8·3 mg. per 100 c.c. of blood), so that there is a relatively supersaturated solution of the lactim form of urate; even on purine-free diets gouty blood contains an excess of uric acid independently of acute attacks. This conclusion has been confirmed since the introduction of Folin's[8] new method of estimating uric acid.

Irregular periods of nitrogen retention and loss are quite frequent features in gout. The cause of the variations is uncertain, although it is probable that the major part is accounted for by purine retention; most of the excessive loss occurs during acute attacks (Brugsch[9]). The statements respecting phosphorus metabolism in gout are varied and contradictory, but there does not appear to be any pronounced variation from the normal. In view of the ascertained fact that the calcium coefficient, particularly in respect of the urine, depends on the intake, it was essential during observations to prescribe a fixed diet of known composition.

Present Observations.

The following, briefly, are the methods employed in my analyses of urine, fæces, and foodstuffs. Phosphorus was estimated by Neumann's method; moisture by drying at 100° C. and weighing to constant weight; uric acid by the method of Folin and Shaffer; calcium by Aron's method; and total nitrogen by Kjeldahl's method. These are standard methods, and do not therefore need description. It should be added that Aron's method[10] for calcium was found quite trustworthy when applied to foodstuffs, blood, and fæces, but in the case of urine gave results which were too high. Professor Spiro kindly informed me, on inquiry, that he had found the method inaccurate in the analysis of the urine because of the large amount of alkali sulphates thrown out of solution on the addition of alcohol and weighed with the calcium sulphate. He said he had modified the method as follows: Take 500 c.c. of urine, evaporate down to 150 c.c. and then add ammonia and ammonium oxalate sufficient to precipitate all the calcium present. Allow the vessel to stand one or two hours and decant the fluid through a folded filter. Return the filter to the flask and oxidise by Neumann's method. After this process quantitatively transfer it to a beaker and precipitate the calcium sulphate with three to four volumes of 40 per cent. alcohol. The precipitate is washed, dried, and finally weighed in a Gooch crucible. This is the method I adopted for the urine, except that 95 per cent. alcohol was used, as it was found that in 40 per cent. strength it was insufficient to cause complete precipitation.

Diet.

The two cases investigated were in hospital simultaneously and received the same diet, the following being the daily regimen: Bread, 395 gms.; butter, 55 gms.; sugar, 30 gms.; oatmeal porridge, 298 gms. (weighed after cooking 55 gms. of Quaker oats); meat (beef), 100 gms., weighed after cooking; potatoes, 260 gms. weighed after cooking; milk, 1 litre; Salutaris water, 500 c.c. (calcium-free). The porridge was made with 400 c.c. water; 600 c.c. of water were also taken in the form of weak tea. The following figures summarise the analyses for nitrogen, phosphorus, and calcium in the diet. Each is the mean of two or more analyses:—

—	Nitrogen.		Phosphorus.		Calcium.	
	Per cent.	Gms. in daily food	Per cent.	Gms. in daily food	Per cent.	Gms. in daily food
Bread	1·15	4·59	0·16	0·64	0·017	0·06
Milk	0·5	5·0	0·027	0·27	0·16	1·6
Butter ...	0·14	0·07	0	0	0	0
Meat	3·72	3·72	0·42	0·42	0·024	0·024
Potatoes* ...	0·30	0·78	0·09	0·24	—	—
Oatmeal ...	0·29	0·86	0·20	0·60	0·087	0·25

* No estimation of calcium in potatoes was made. Bunge in his tables (Physiol. d. Menschen, ii., 88) states that 1000 gms. of potatoes contain 1 gramme of calcium oxide.

Clinical Data.

Before going on to consider the composition of the urine and fæces, it will be convenient to describe briefly the clinical condition of the two patients.

[1] Berlin. klin. Wochenschrift, 1904, No. 41.
[2] Zeitsch. f. Biol., xli., 1901; xlv., 1904.
[3] Ibid., xii., 1876.
[4] Zeitsch. f. klin. Med., lvii., 1905.
[5] Chemistry of Food Nutrition, 286. 1st edition.
[6] J. C. DaCosta and others: Publications from the Jefferson Medical College, Philadelphia, vi., 1, 1915.
[7] Zeitsch. f. Physiol. Chem., lxiii., 455, 1909.
[8] Folin and Denis: Journ. Biol. Chem., xiii., 469, 1913.
[9] Zeitsch. Expt. Path. Ther., 1906, 619.
[10] Biochem. Zeitsch., iv., 268, 1907.

CASE 1.—The patient, a man aged 49, had suffered from gout for 22 years, first in the big toe and subsequently in many other joints, and had tophi in the ears and fingers. He used to take a large amount of cheap beer, and to eat a lot of meat. He was subject to attacks about once a month, and his last attack, in the big toe, had begun five days before admission. His systolic blood pressure was 210 mm. Hg; the specific gravity of the urine was 1015; there was a small amount of albumin present in the latter and also a few casts. There was no cardiac murmur. He had no acute attack during his stay in hospital and was free from pain.

CASE 2.—The patient, a man aged 40, suffered from a first attack of gout in a big toe about 12 years previously and had had frequent attacks thereafter, with the pain flitting from joint to joint. The existing attack began about two months before admission. The various attacks had affected nearly all the joints with the exception of the shoulders. Subsequent to admission two joints, the left big toe and left wrist, had been affected. No cardiac murmurs, no albuminuria, small tophi in ears; systolic blood pressure 160 mm. Hg.

Excretions.—Both of the above patients were under observation from Feb. 17th to March 9th. From Feb. 24th to March 3rd (eight days) they received no calcium except what was in the food; from March 4th to 6th (three days) they took extra calcium in the form of calcium chloride equivalent in terms of calcium oxide to 0·735 gm. in the 24 hours. The urine and fæces were analysed each day, and the following table gives the daily averages of the two periods (A) without and (B) with the calcium chloride addition.

TABLE I.

—		Nitrogen in gms.				Phosphorus in gms.				Calcium as CaO in gms.			
		Food.	Urine.	Fæces.	Balance	Food.	Urine.	Fæces.	Balance	Food.	Urine.	Fæces.	Balance
Case 1	A	14·9	15·1	2·5	−2·7	2·1	1·1	0·9	+0·1	2·0	0·13	2·3	−0·4
	B	15·0	11·7	1·4	+1·9	2·1	1·07	0·5	+0·4	2·73	0·14	1·37	+1·1
Case 2	A	14·9	10·7	1·6	+2·6	2·1	1·04	0·34	+0·72	2·0	0·14	1·3	+0·8
	B	15·0	7·4	1·5	+6·1	2·1	0·86	0·4	+0·84	2·73	0·11	2·14	+0·4

A sample of blood was taken from the two patients the day before they left the hospital and analysed. In Case 1 the blood calcium content was 0·071 per cent. calcium oxide; in Case 2 it was 0·062. From these figures it will be seen that the administration of calcium chloride was accompanied by a retention of nitrogen; there was little or no change in phosphorus metabolism, and with regard to the calcium it led in the first case to retention of that element, and in the second the retention which occurred previously to taking the calcium salt was diminished. The change, however, in either direction was not large, and the calcium content of the urine remained unaltered in both cases. The result, however, which most interested me was the effect upon uric acid excretion in the urine, shown in Tables II. and III.

TABLE II.—*Uric Acid Excretion in Grammes.*

Case 1.		Case 2.	
Before administration of calcium chloride.	During administration of calcium chloride.	Before administration of calcium chloride.	During administration of calcium chloride.
0·64	0·43	0·31	0·17
0·65	0·32	0·24	0·13
0·66	0·36	0·28	0·12
0·62		0·23	
0·42		0·31	
0·55		0·28	
0·54		0·16	
Mean 0·61	Mean 0·37	Mean 0·28	Mean 0·14

It will be observed that there is a marked decrease in the uric acid output during the administration of calcium. In two other somewhat similar cases (long-continued gout with fairly frequent acute attacks), taking the same fixed diet, I found a like effect upon the uric acid output produced by the administration of calcium chloride (10 grains three times a day).

TABLE III.—*Uric Acid in Grammes.*

—	Case 3.	Case 4.
Before giving $CaCl_2$ (5 days)	0·12	0·062
During administration of $CaCl_2$ (4 days)	0·10	0·012
After administration of $CaCl_2$ (2 days)	0·15	0·083
During administration of atophan (3 days)	0·33	0·188
After administration of atophan (1 day)	0·17	0·093

I am unable to offer any explanation of this effect of a soluble calcium salt upon the uric acid output. It can scarcely be regarded as beneficial, although in only one of the four cases was it accompanied by any return of joint pains. My opinion, based upon clinical observation, is that the lime salts tend to aggravate gouty manifestations, and that a restriction of the foodstuffs containing more than moderate quantities of calcium is advisable, especially in tophaceous gout. I have added in the foregoing table the effect of atophan on the excretion of uric acid in these two cases. This drug produced the usual increase in the uric acid output. There are, however, exceptions to this rule. In my private practice a case occurred where the excretion of uric acid was markedly diminished on two occasions by the administration of atophan. On the first occasion the daily output of 11·38 grains was reduced to 6·9, and on the second from 14·63 grains to 5·7. Judging by this result it is necessary to estimate the uric acid output during the exhibition of atophan.

It may be of interest to append the calcium content of those foodstuffs which contain more than a minimal amount of this substance. The figures are taken from A. Neuberg's statistics.[11]

TABLE IV.—*Calcium Content of Foodstuffs.*

Foodstuff.	Total ash. %	CaO % in ash.	CaO in 1000 gms of foodstuff.	Foodstuff.	Total ash. %	CaO % in ash.	CaO in 1000 gms. of foodstuff.
Spinach ...	16·48	11·87	19·6	Endive ...	16·18	12·03	19·5
Celery ...	11·04	13·11	14·5	Oatmeal ..	2·8	7·42	2·08
Rhubarb ..	14·44	10·04	14·6	Plasmon ...	8·69	32·68	2·85
Cow's milk	0·72	22·42	1·62	Quaker oats	3·14	3·73	1·10
Cheese, Parmesan	6·29	34·72	2·18	Brown bread	2·27	1·12	0·25
Pork... ...	4·06	7·53	3·06	Potatoes...	3·79	2·64	1·00

Drinking water is at all times a source of calcium in the diet, and in certain districts this may reach a high figure.

To Dr. F. W. Mott and Dr. William Hunter I must express my sincere acknowledgment for taking the cases into their wards in Charing Cross Hospital. I must also thank Professor W. D. Halliburton for affording me every facility in his laboratory, and my assistant, Mr. J. C. Drummond, B.Sc., for doing the major part of the work.

Summary.

1. The excretion of calcium in the urine of gout is lower than the accepted normal. However, the urinary content forms, as is usually the case, a small fraction of the total output, most of the calcium leaving the body via the fæcal excrement.

2. The effect of administering calcium chloride in two cases of gout, kept on a fixed diet, was to cause a slight retention of nitrogen, but the phosphorus metabolism was practically unaffected.

3. The effect on total calcium metabolism was not constant. In one case a small negative calcium balance was transformed into a small positive one; in the other the positive calcium balance was reduced. In both cases the urinary calcium was not affected.

4. In the four cases observed the giving of calcium chloride produced a marked fall in the uric acid output in the urine. The explanation of this observation is not at present forthcoming; it suggests that the administration of food rich in calcium should be restricted in cases of gout.

[11] Mineralstoffwechsel, Berlin, 1906.

JOURNALS.

Quarterly Journal of Medicine. Edited by WILLIAM OSLER, J. ROSE BRADFORD, A. E. GARROD, R. HUTCHISON, H. D. ROLLESTON, and W. HALE WHITE. Vol. X., Nos. 37 and 38. October, 1916, and January, 1917. Oxford: At the Clarendon Press; London, Edinburgh, New York, Toronto, and Melbourne: Humphrey Milford. Subscription price, 25*s.* per annum. Single numbers, 8*s.* 6*d.* net each.—The contents of this number are: 1. Septicæmia due to *Micrococcus tetragenus* as a Cause of Pyrexia at the Front, by A. H. Birks, R. T. Thornley, and R. A. Fawcus. From a study of obscure cases of pyrexia occurring at the front at the present time the authors conclude that a large proportion of all these cases are septicæmias which fall into two general types, one clinically resembling paratyphoid, the other being called "trench fever." The most common of these septicæmias is tetragenus fever due to the *Micrococcus tetragenus*. These cases appear to have some characteristic features—namely, a sudden onset, headache, and pains in the lumbar regions and down the legs, with tenderness over the tibia. Anæmia is common and lethargy is the most characteristic mental state. 2. A Study of the Metabolism in a Case of Amyotonia Congenita, by F. Powis and H. S. Raper. A case of this condition is described in a girl aged 4 years, upon whom metabolic investigations were made in three separate periods of five days each. The chief conditions noticed were a diminution of hepatic functional activity manifested by the presence of acholia, a normal calcium retention with a relatively high potassium retention, and a low creatinine excretion with a relatively high creatine excretion. The authors state that they have published this account of a single case in order that other investigators may be able to confirm or disprove the constancy of these abnormal features. 3. Records of Speech in General Paralysis, by E. W. Scripture. An interesting study of the speech difficulties in general paralysis investigated by means of a special recording apparatus is here presented. An analysis of the records obtained apparently calls for very minute investigation, so that a single sentence may require something like five hours to analyse, but the results obtained throw an interesting light upon the nature of the speech disorders. The chief condition observed is one to which the name asaphia is applied as a substitute for the misleading one of cortical ataxia, to indicate a lack of precision in speech. Dr. Scripture finds that asaphia is an early symptom in the record of the general paralytic, whereas it never occurs in neurasthenia. 4. The Retinitis of Arterio-sclerosis, and its Relation to Renal Retinitis and to Cerebral Vascular Disease, by H. Foster Moore. This paper is based upon a careful examination of the clinical and ophthalmic conditions found in 66 patients seen at Moorfields Eye Hospital and 44 seen at St. Bartholomew's Hospital. The changes in the retina and its vessels occurring in arterio-sclerosis are carefully recorded and their relative importance discussed. The work of Marcus Gunn upon the same subject is confirmed and extended. Next Mr. Foster Moore brings forward evidence tending to establish the existence of an arterio-sclerotic retinitis as a clinical entity. He then studies the relation of sclerosis of the retinal arteries to cerebral arterio-sclerosis, which he regards as both striking and conclusive. The paper is illustrated by some admirable drawings and coloured plates. 5. On the Early Stages of Wounds in the Chest. Cases of chest wounds have been studied by Colonel Sir W. P. Herringham at a casualty clearing station near the front. Unless a case shows symptoms of sepsis, or has some complication rendering it more severe than usual, it has been found by Sir W. P. Herringham best to send the case back to the base when 72 hours have been completed from the time that the wound was received. Of 211 consecutive cases, 22 died at the clearing station and the remainder were evacuated to the base. Hæmothorax is almost always present. Congestion of the opposite lung apparently occurs very frequently, but is only dangerous if it is of large extent and the wounded lung is useless. 6. Jaundice of Infective Origin, by Colonel Sir Bertrand Dawson and Colonel William E. Hume. This paper deals with jaundice due to a spirochæte, and it is differentiated from other forms of infective jaundice. It is illustrated by several excellent coloured plates and is an important contribution to the subject with which it deals. This paper has already been noticed in a leading article in THE LANCET of Feb. 3rd, 1917. 7. Lipodystrophia Progressiva, by Dr. F. Parkes Weber. A critical review with a bibliography of this rare and interesting condition is given, and its pathology and relation to other disorders of the subcutaneous fat are discussed.

Journal of Nervous and Mental Disease, February, 1917.—This number contains full reports of meetings of the New York and Boston Neurological Societies at which last summer's epidemic of poliomyelitis was discussed at great length from various points of view. At the Boston Society statistics were given showing that 90 per cent. of cases were under 5 years of age and 4 per cent. over 15. The total mortality was 19 5 per cent., and the mortality figures were notably higher during the first half of the epidemic than during the second half. Dr. Edwin H. Place mentioned his results with immune serum, of which 10 c.c. doses were given two or three times in 24 hours. Three of 8 preparalytic cases treated with immune serum developed paralysis, while of 16 preparalytic cases not treated only 1 developed paralysis. Of 40 cases in which immune serum was administered 52 per cent. died; in 33 per cent. there was extension of paralysis, in 15 per cent. no extension. As chiefly the most desperate cases were treated with serum the poor results may perhaps thus be explained. As regards diagnosis at an early stage, obviously a matter of the first importance, several speakers discussed the significance of changes in the cerebro-spinal fluid. In the prodromal stage of from one to four days, while there may be little clinically to attract attention, the fluid may show gross alterations from the normal. In a series of cases recorded by Dr. Francis W. Peabody the fluid was found to be under increase of pressure, and cytological examination showed an average of 300 cells per c.mm., of which from 80 to 90 per cent. were polymorphonuclears. The smallest count in the prodromal stage was 34 cells per c.mm. and the largest no less than 1980. Within a week of the onset of paralysis the count diminishes and mononuclears to a large extent replace the others. The globulin at first is slight and increases in inverse proportion to the cells up to the third or fourth week. Apparently the attitude of the lay press in certain quarters, and of the public generally, left much to be desired, as several of the Boston speakers mentioned the "hysteria" that had surrounded the subject, more particularly in regard to schools and "senseless and useless" methods of quarantine. As there is little evidence in favour of the theory of direct transmission by contact, many of the precautions taken were stigmatised as "absurd." Nevertheless, in such affairs it is clearly the duty of the profession to lead the public, and though our knowledge of the epidemiology of the disease is still imperfect, restrictions ought not to be laid down in which the profession does not believe. At the New York Neurological Society the meeting was held in conjunction with the Neurological Section of the New York Academy of Medicine. There was unsparing criticism of the organisation and the methods adopted to cope with the epidemic. Dr. Frederick Tilney said that the epidemic, the third in nine years, found them unprepared. "Quarantine was a travesty, and hospitals were not ready." Among much domestic criticism which scarcely concerns us reference may be allowed to the fact, emphasised by speaker after speaker, of the lack of coördination and coöperation between the State health authorities and the professing neurologists of the city of New York. The neurologist was apparently ignored. It was stated that the important report of the Committee of the New York Neurological Society on the epidemic of 1907 (reviewed in THE LANCET of July 9th, 1910) seemed to have been forgotten by those who had the official control of affairs. Eventually it was resolved that the Academy of Medicine should be asked to consider the advisability of appointing a poliomyelitis commission, with four subcommittees, to consider ways and means best calculated to meet and combat a future epidemic: first, a committee on communicability and quarantine, comprised of bacteriologists and epidemiologists; second, a committee on the clinical aspect of the disease, consisting of neurologists, pediatrists, and orthopædists; third, a committee on pathology, consisting of pathologists; and, fourth, a committee on treatment and immunisation, comprising neurologists, orthopædists, pediatrists, and bacteriologists. Here in England we have not had such overwhelming epidemics as have ravaged other parts of the world, but it behoves us to profit from the trying experiences of others

THE LANCET.

LONDON: SATURDAY, MARCH 31, 1917.

Medicine and State Control.

THE possibility that the profession of medicine may be transformed by various influences and for different reasons into a State service is frequently alluded to in the public press, and the reason of this is obvious. Medical men are required urgently for the Army and Navy, and no less urgently of the civilian population, and it is evident that if the State were the employer the existing supply would be at the absolute disposal of the authorities without further formality. This consummation may be desirable, but it seems to medical men that there is little general comprehension of what a State Medical Service means. So long as the principal rôle of medicine was to deal with full-blown disease, or to remove acquired disabilities, its practice remained largely a personal matter between doctor and patient, the State merely stepping in to insist that the doctor's claims to treat and relieve were based on a certain minimum of training and attainment. With the dawn of preventive medicine, as evidenced by the desire to stem disease at its source and to avoid the occurrence of physical disabilities, the concern of the State in the matter became intimate, for legislation was required to bring these desirable things about. Thus one Government department after another assumed the control of branches of medical practice in which they were specially interested and appointed special staffs to advise the department on medical matters. The evolution of a medical service to a high degree of importance and efficiency is apparent, of course, in connexion with the Army, where within a generation a sanitary organisation has been created under which typhoid has disappeared from the forces waging the greatest war the world has ever known. But let us not forget that even now the anomaly persists of the Director of the Medical Services having no seat on the War Council and being subordinate to the Adjutant's department. Civilian medical practice is similarly not represented directly in the government of the country, and has not a Minister responsible to Parliament and backed by the support of the people. If the Bill, whose introduction is expected by Lord RHONDDA, the President of the Local Government Board, recognises this point of view, it will assuredly command full medical support.

A unification of the medical services of the country would be the immediate outcome of the appointment of such a Minister. For a long time past the Local Government Board, the Board of Education, the Home Office, and the Board of Trade have had their own medical departments. The National Insurance Commissioners have more recently become largely responsible for certain uniform medical treatment throughout the country, and here some order exists in the employment of research workers, pathologists, chemists, and bacteriologists in systematic action for the prevention as well as for the detection of disease—we refer to the Medical Research Committee. Elsewhere no such order can be found. During the war the medical services of the Navy and Army have developed enormous activity; the Ministry of Munitions has come in with a far-reaching scheme of industrial hygiene; the Pensions Ministry is dealing with the colossal problem of the disabled soldier, and the Ministry of Labour is now joining it in this work. Perhaps the Minister of Blockade is the only member of the Government who has no medical staff. This divided control means not only confusion and dissipated energy from overlapping, but inevitably leaves places which are no-man's-land. Although the infant is now the object of assiduous care of a Government department, the child of 2 to 5 years has abundant opportunity to develop disease and disability, which is often too advanced for simple and efficient treatment when observed by officers of another medical department. The persistence of that terrible plague ophthalmia neonatorum may, as the recent report of the Central Council for District Nursing in London indicates, be largely attributed to dual notification and control. The general practitioner who attends his patient throughout the seven ages of man is under the observation of as many Government departments in doing so. A Ministry of Public Health, whose rôle it should be to care for the health of the citizen "from the cradle to the grave," as Mr. LONG expressed it, would tend towards efficiency and economy, and initiate a new era in the history of public health. Lord RHONDDA stated recently, when receiving a deputation from the British Medical Association, that he was for such a health department with an advisory medical council to assist it, without repeating Mr. LONG'S claim that the head of the Local Government Board was himself really the Minister responsible for public health.

All agree that due recognition of the importance of medical science to the nation is desirable, and those who have thought the affair out hold that the unification of central medical control must, to this very end, be worked for. Opinion varies widely on the best method of delegating the central authority. To the official mind a civilian State Medical Service with fixed salaries and orderly gradation from higher to lower authority is the natural solution. The official view is apparently proved by recent experience of the efficiency of the Army Medical Service. But there are many—discipline prevents accurate knowledge of how many—who chafe under the official régime, feeling that their powers are not being used to the best advantage therein. And it must not be forgotten that an overwhelming proportion of the present Army Medical Corps is made up of drafted-in civilians, who have been free to shape their own careers, and who are not at all convinced that the prescribed pattern is very good. And the nation does not like the official attitude

towards its ills. Dr. ESTHER CARLING, chief medical officer of the Berks and Bucks Joint Sanatorium, has told us that town councils cannot deal sympathetically with infant welfare work; and half a century of conscientious practice by Poor-law doctors has not removed the popular prejudice against the Poor-law infirmary. The general practitioner continues to absorb the main esteem of the public, and Sir T. CLIFFORD ALLBUTT'S fear of taking out of the general practitioner's hands the responsibility for treatment of many kinds is widely felt in the medical profession. But it would be met by Mr. H. B. BRACKENBURY'S offer to Lord RHONDDA to elaborate a scheme for utilising the general practitioner in a unified Health Department. The President of the Local Government Board, in welcoming this suggestion, has stated that his legislative plans are adoptive and present no obstacle to its realisation.

The Prevalence and Treatment of Cerebro-spinal Fever.

COMPULSORY notification of this disease came into force for the whole of the United Kingdom in 1912, so that opportunity has been thereby afforded for study of its prevalence in this country during war-time, as compared with pre-war conditions, although difficulties in connexion with diagnosis render the statistics at present available somewhat unreliable. With this proviso, the following figures were given recently by Lieutenant-Colonel S. MONCKTON COPEMAN, F.R.S., officer in charge of the hygiene department of the Royal Army Medical College, in an address delivered at the Royal Institute of Public Health:—

Year.	Notification of cerebro-spinal fever.	
	Civilian.	Military (excluding cases originating overseas).
1913	279	—
1914	315	—
1915	2566	1146

The weekly numbers of both military and civilian cases notified during 1916 up to August 31st were indicated in a chart published in the Report of the Medical Officer of the Local Government Board for 1915–1916. It could be seen from this chart that a considerable outbreak of the disease occurred in the early part of 1915, its maximum incidence being reached in the week ending March 13th. In the following year the maximum incidence was less in amount and fell later in the year, but Colonel COPEMAN pointed out the possibility that some of this difference was due to the larger number of men over-seas in 1916 than in 1915, although he reminded his audience that by 1916 the military housing conditions had improved, especially as regards ventilation and the prevention of overcrowding, factors from which much good would naturally be expected.

In a recent issue of THE LANCET we referred to the fasciculus of the *Times* "History of the War" dealing with the epidemic of cerebro-spinal fever in 1915, and we take the opportunity of modifying a sentence in which we appear to reflect upon the accuracy of our contemporary's history. It was a correct statement in the *Times* that the Director-General of the Army Medical Service invited the Medical Research Committee to come to his assistance when preparing a plan of campaign, having regard to the grave menace to the troops in training throughout the British Isles. The plan was drawn up promptly upon the advice of Dr. MERVYN GORDON, already the author of admirable work in connexion with the bacteriology of the disease, and when later Dr. GORDON was gazetted as a major in the Royal Army Medical Corps, the Medical Research Committee provided his whole-time service for the country on full colonel's pay, on the understanding that the appointment was definitely made by the War Office, and that in devising any arrangements he had the official authority of the War Office and would not be acting merely as a scientific worker employed by the Medical Research Committee. No appointment could have been made more suited to the needs of the situation. Dr. GORDON and Colonel HORROCKS, the adviser on sanitation to the Army Council, made immediate inquiries into the outbreak of the disease that had occurred in the Canadian camps, and later Surgeon-Colonel R. J. REECE, who is now in charge of the military statistics on the subject, was associated with the work. Surgeon-Colonel REECE has informed Colonel COPEMAN that when the revised official figures are available there will be found evidence that in each of the years 1915–1916 the rise in military notifications definitely preceded similar increment in the civilian numbers, thus probably indicating spread of the disease from the military to the civilian population, in which extension the Canadian troops appear to have been specially concerned. The precautions taken in view of the possibility of wide extension of the disease, especially in the new armies under training, were sound and far-reaching. Not only were cases isolated as they occurred, but contacts were segregated, and, in each case, bacteriological examination of cultures was obtained by swabbing the naso-pharynx. Those found not to be harbouring the meningococcus could thus be returned to duty with the least possible delay, while the remainder were isolated until positive results were no longer obtained. A central cerebro-spinal laboratory was equipped at the Royal Army Medical College, and no less than 37 district laboratories in the country were started or coöpted with their existing staffs. In these circumstances, pointed out by Colonel COPEMAN, it has been found possible to release about 70 per cent. of the contacts within 24 to 48 hours, and the majority of the remainder within two to four days later, whereas in the absence of bacteriological examination it would have been necessary to retain from duty all these men for three weeks, the average period during which the organism has been found to persist in the naso-pharynx.

Determination by Colonel GORDON of the special characteristics of the meningococci from the cerebro-spinal fluid of cases of the disease has shown that

these may be of four specifically distinct types, of which two are most frequently isolated; but, said Colonel COPEMAN, the type may vary at different periods during the same outbreak. These facts will be recognised as having an important bearing on the question of specific treatment, as a serum produced by the use of meningococci of one type will be practically valueless in the event of the outbreak being associated with another type of the organism. In absence of determination of the special type of meningococci, obviously the likelihood of obtaining satisfactory results from specific treatment will lie in the use of a serum polyvalent for all types, and encouraging results have followed the use of such a polyvalent serum produced by the Lister Institute and others, as noted by Surgeon-General H. D. ROLLESTON in his recent report on Cerebro-spinal Fever in the Navy.[1] In the event of the meningococcus being isolated from the throat, as well as from the cerebro-spinal fluid of a case suffering from the disease, it has been found that the type in each instance will be the same. This also holds good for cultures from the naso-pharynx of positive contacts of the case, a fact which has on occasion proved of special service in the tracing of possibly unsuspected carriers.

As there are certainly indications of the existence of the disease at the present season in several localities, it is well to publish in full Colonel COPEMAN'S remarks on its spread and the methods of prophylaxis to be adopted. He said:—

As regards the *spread of the disease*, the trend of opinion is towards considering the healthy carrier as being for the most part responsible. Several observers, however, have found the meningococcus present to the extent of at least 2 per cent. in the naso-pharynx of non-contacts from non-epidemic areas—in other words, from the general population—so that it is obvious that further information is needed as to the precise circumstances under which spreading of the disease takes place.

Prophylaxis; Treatment of carriers.—The meningococcus being one of the least resistant of pathogenic bacteria and easily killed by various disinfectant substances in low concentration, the question arose as to the feasibility of destroying it *in situ* in the naso-pharynx by disinfectant solutions, or sprays.

As regards personal prophylaxis, good results have been obtained by *nasal insufflation* of 0·5 to 1 per cent. solution of chloramine, or of 1-5000 permanganate dissolved in normal saline. For prophylactic treatment of large bodies of men, as also for the clearing up of chronic carriers, promising results have been obtained by causing steam to pass through an *inhaling-room*, the air of which is charged with steam and fine droplets of antiseptic solution sprayed by a steam atomiser. The solutions sprayed have been either 1 per cent. zinc sulphate dissolved in normal saline, or in cases of chronic carriers 1 to 2 per cent. of chloramine. The men remain in the inhaling-room for five minutes, during which they inhale vigorously through the nose.

This simple and detailed instruction will be of service to our readers.

[1] THE LANCET, 1917, i., 56.

Major H. MacCormac, R.A.M.C., will read a paper on Skin Diseases under War Conditions in France before the Dermatological Section of the Royal Society of Medicine at the Society's House on Thursday, April 19th, at 5 P.M. A discussion will follow.

Annotations.

"Ne quid nimis."

WORKHOUSES AND FOOD RESTRICTIONS.

Boards of guardians appear to approach the questions raised by Lord Devonport's effort to restrict the consumption of certain staple articles of diet from different points of view. In the notes recording meetings of guardians in a recent issue of the *Local Government Chronicle* occurs an account of a discussion raised at Liverpool upon a revised scale of dietary for the officers of the workhouse. The allowance of meat appears to have been reduced, to what amount is not stated; but "formerly" the weight assigned weekly to each officer was 11½ lb. A member of the select vestry, who called attention to this figure, expressed not unjustifiable surprise at the digestive powers of those who ate so much. No suggestion, however, seems to have been made as to the substitution of any other kind of food to take the place of the mass of meat which would have to be held back if Lord Devonport's scale were to be adopted. At another guardians' meeting, that at Goole, one of the innovations proposed in the dietary consisted in the substitution of rice-pudding for roast beef, potatoes, and bread in the Sunday dinner for inmates. It was decided after some discussion to make the other reductions proposed in the dietary for week-days but to leave the Sunday dinner as before. No mention is made in the report as to any suggestion of difficulty in the obtaining of potatoes, so possibly the workhouse at Goole is self-supporting in this matter, or has otherwise accumulated a stock. It does not appear either to have been suggested that more economical ways of cooking meat than by roasting it, and the adoption of other foods to lessen the consumption of potatoes and bread, would have afforded a *via media* between the normal Sunday meal of peace-time and the somewhat cheerless alternative of rice-pudding. In another union, that of Kingsbridge, the discussion turned mainly upon the bread ration. Two 4 lb. loaves seem to have been the normal allowance for inmates of Kingsbridge workhouse per week, and the master declared that 7 lb. 5 oz. per head would be the least amount that would suffice. The chairman of the board in support of this view stated emphatically that no working man could subsist upon 4 lb. of bread a week, an opinion which, taken by itself, is reasonable enough. In discussing the dietary of a workhouse, however, it might be borne in mind that such an institution differs from a workman's home, and that its inmates are not labourers in full work. The workhouse has a kitchen and cooks who either are, or ought to be, sufficiently trained to be able to prepare palatable and nourishing dishes without exceeding the limit for meat, dishes, moreover, which would not have to be supplemented by an undue consumption of bread. That an increased, and increasing, expenditure upon food has to be faced by guardians is obvious. They have, however, an advantage besides that of kitchens in which food can be prepared upon a large scale. Owing to their being able to buy upon a large scale they can obtain their supplies more cheaply than private individuals, and there can be no reason why inmates of workhouses should con-

sume more bread, meat, and sugar than their fellow men, or why the possibly unwelcome innovations, which all are now introducing into their daily meals, should be excluded from Poor-law institutions.

THE NATION'S TOBACCO BILL IN WAR-TIME.

ACCORDING to the honorary statistician of the British Anti-tobacco and Anti-narcotic League the tobacco bill of the nation for the year 1916 has exceeded that of the previous year by £8,650,000, the total expenditure now reaching the figure of £48,630,000. The increase in consumption, however, according to the same return, is out of all proportion to this, for it is 3·8 per cent., as against 21½ per cent. expenditure. The increase in consumption, it is interesting to note, since 1911 is 24½ per cent., and the increase in expenditure 53½ per cent. It may be concluded that the increased expenditure includes the raised cost of tobacco and duty. Considering, therefore, the increased inducements to smoke owing to the war this advance in consumption is not so large as might have been expected, although the total amount consumed and the money expended upon it appear as formidable figures. Well-meaning people are calling attention to these statistics and ask that some steps should be taken to effect a substantial reduction in this bill in the interests both of economy and the nation's health.

VESICAL CALCULUS AFTER WOUNDS OF THE BLADDER.

AT a recent meeting of the Académie de Médecine of Paris, M. F. Legueu called attention to the frequency of calculus after wounds of the bladder. Among 32 cases under his observation he found calculus in 10. Its formation has been explained by infection. But all wounds of the bladder are infected, and the infection does not last longer and is not more severe in cases in which calculus forms than in those in which it does not form. M. Legueu noticed that calculus formed only in cases in which the wound of the bladder was accompanied by fracture of the pelvis. He, therefore, concluded that the calculus must be an indirect effect of the fracture. When a foreign body enters the pelvis it almost always breaks bone in its passage. The fracture is doubly complicated—by communication with the exterior and with the bladder. The urine reaches the site of fracture and fragments of bone enter the bladder. M. Legueu has found them implanted in its wall or included in the calculus. When there are no splinters of bone minute particles pass through the fistula, and it is to them, he thinks, that the formation of the calculi is due. Long after the cicatrisation of the external wounds he has found, with the cystoscope or during operation, an osteopathic fistula connecting the bladder with a focus of osteomyelitis. Through this fistula bone powder falls into the bladder, and remains there the more easily as the patient is immobilised on his back for a long time by the fracture. This insoluble powder becomes the nucleus of crystallisation of calculi. All the calculi which he observed were soft, pliable, and white. When broken a small sequestrum was rarely found at the centre; more often nothing was found, for the powder which gave rise to calculi had been reduced to imperceptible particles. As to the treatment, cystotomy for the purpose of detaching the bladder from its point of adhesion to bone and closing the fistula was not successful. The bladder is torn in the process, and repair, already difficult, is rendered more so and the case is prolonged. In two cases M. Legueu followed this treatment, producing greater evils than those he tried to remedy. In all the other cases he performed lithotrity with good results. The operation is even possible if the calculus contains bony fragments which cannot be broken up. They can be extracted through the instrument. No doubt fresh calculi may form after the operation, but they can be dealt with by the same simple operation until the fistula closes and the formation of calculi ceases.

TUBERCULOSIS OF THE TONGUE.

THE frequency of localisation of tuberculous processes in the tongue as evidenced from the reports of necropsies and from clinical experience is somewhat rare, and it is therefore interesting to note five cases of this condition, observed in the Mayo clinic, in Rochester, U.S.A., published recently by Dr. Luigi Durante in *Il Policlinico*.[1] The reason of the relative infrequency of tuberculous lesions of the tongue, an organ so close to the source of infection, is probably due to two factors: the peculiar structure of the lingual mucous membrane being resistant to direct penetration by the bacillus and also the natural resistance which all striated muscle presents to bacillary localisation owing to the marked antibacterial action of glycogen towards all micro-organisms in general and to Koch's bacillus in particular. The age of the majority of cases of this disease is between 20 and 60 years, it is unknown in childhood when tuberculous lesions are frequent and widespread. These facts justify the conclusion that certain causes incidental to this period of life favour the occurrence of lingual tubercle, such as erosions of the mucous membrane produced by pipe-smoking, dental caries, and toxic glossitis, and also explain the relative frequency in the male sex. The beginning of the lesion is always characterised by specific connective-tissue formation in the shape of a tuberculous nodule situated either in the derma of the mucosa or in the lingual parenchyma, and from this origin two distinct clinical types follow, one in which development proceeds at the expense of the lingual derma, having characters approximating to those of cutaneous lupus, and the other where the intramuscular connective tissue is chiefly involved producing granulomata or being gummatous; they may closely simulate neoplasms or tertiary syphilis. Typical tuberculous ulceration has irregular outlines, with sinuous, soft, red edges, a yellowish base covered with easily bleeding granulations, and may occur in any part of the tongue, but has a preference for the edges and tip. The persistence of these two clinical forms, the ulcerative and the nodular, seems to be influenced by the condition and course which the tuberculous infection assumes in other parts of the body—that is to say, those forms which maintain for a long time the nodular type accompany a tuberculous infection, usually in the lungs, of slow course and without tendency to break down, or else are strictly primary, while those forms which tend to become rapidly caseous are habitually concomitant with and secondary to deep and destructive lesions in other organs. In the 5 cases now published by Dr. Durante 2 occurred in females and all between the ages of

[1] Surgical Section, Oct. 15th, 1916.

20 and 50 years. As no necropsies were made the diagnosis of primary lingual tuberculosis arrived at in 2 cases in the absence of any other apparent tuberculous lesion has only a clinical and not an absolute value. In the other 3 cases it was secondary to, and a late episode of, broncho-pulmonary lesions. In 4 cases the type of lingual lesion was ulcerative, situated at the edge, and the result of a granuloma deep in the parenchyma. In the other case the type was nodular and had remained in that condition for 10 years, and was the only tuberculous lesion ascertained to exist. In the remaining 4 cases the ulcerating stage was developed after three to four months. This shows that it is not so much the local site which determines the different anatomical aspect of a specific process, such as the tuberculous, as the conditions of reaction in the whole organism. There was glandular enlargement in the four ulcerative cases, but not in that where the intralingual granuloma remained intact. Clinical diagnosis was easy in three cases in which the ulcer in the tongue existed simultaneously with tuberculous pulmonary lesions. In all cases the nature of the lesion was proved, in two of them by excision and in the others by biopsies previous to treatment by cauterisation.

NURSERY SCHOOLS.

TEMPTED by the prospect of high wages, often in addition to the husband's earnings or a separation allowance, a large number of married women are now working in munition factories for periods of 8 to 12 hours on day or night shift. What time the mother has at home and does not spend in sleep she requires for rest and meals, leaving little or no opportunity for attention to the children. To these factors Dr. Sidney C. Lawrence, in his recent report to the Edmonton education committee, attributes the increased infantile death- and sickness-rate, as well as a return to the highly verminous condition of the children first revealed in 1908 by school medical inspection. In order to remedy this situation Dr. Lawrence proposes, not to prohibit married women leaving their homes without making proper provision for the children, but to accept the evil necessity and mitigate its drawbacks by providing for the children elsewhere. He prescribes the raising of the age of school admission to 7 years and the conversion of infant departments into voluntary nursery schools for the reception and maintenance of children from 1 month to 7 years of age, open day and night alike. In each such department he would retain the headmistress as superintendent with the assistance of suitable "motherly" widows requiring a smaller wage than the school teachers, and he would invite older girls to attend for practical lessons in mothercraft. The expense, he says, of such a venture need not be great, as the Board of Education and the Ministry of Munitions are ready to provide 75 per cent. of the capital cost and a handsome subsidy towards current expenses—up to 7*d.* a child for 12 hours' attendance. A similar payment by the mothers would leave but a small remaining margin of expense for the local authority to defray. Dr. Lawrence's scheme has, we believe, attracted a good deal of attention and has not escaped criticism in details. On the desirability of providing some sort of other care for children whose mothers go out to work no diversity of opinion can exist, but the risk from infection incurred by segregating numbers of young children together must not be lost sight of. Whooping-cough and chicken-pox are not at the age of 1 to 5 years the trifling ailments they are often supposed to be, and we now know that measles at that age is a very malignant disorder. Following one upon the other the risk to life is very great, and the larger the nursery school and the less skilled the supervision the greater the risk of catching these complaints.

SMALL-POX IN GERMANY.

SINCE the beginning of the year cases of small-pox have occurred in most of the administrative districts of Northern Germany, spread, it is stated, by tramps and wandering labourers. In February a small outbreak was reported in Berlin, leading to the compulsory notification of suspects and a strong recommendation for the revaccination of the civilian population. The *Deutsche medizinische Wochenschrift* of March 1st reports the number of cases in Berlin hospitals on that date as about 50, stating that they mostly arose amongst immigrants or occupants of lodging-houses, and suggesting the advisability of revaccinating adults above 40 years of age in view of Gins's statistical proof (*D. m. W.*, 1916, No. 38) that the immunity of the second vaccination at 12 years of age does not generally survive beyond the forty-fifth year. Practically all the cases were above this age. For a time revaccination in Berlin proceeded so briskly that lymph ran short.

THE ESTIMATION OF THE URIC ACID OF THE BLOOD IN BRIGHT'S DISEASE.

IN many clinical investigations the use of a colour scale provides a ready method of exact estimation of quantity in regard to substances of uncertain chemical composition or which do not lend themselves to isolation and weighing. Dr. Paul Bartholow, assistant in applied therapeutics at the College of Physicians and Surgeons of Columbia University, has made an ingenious application of the method to the Brugsch-Kristeller test, which he considers to be the finest so far devised by chemists for the estimation of uric acid, depending as it does upon the rule that the reaction of uric acid and sodium tungstate in solution is marked by a blue colour. He describes the test itself as follows:—

> One c.c. of blood is sufficient, but it is generally convenient to draw 2 c.c. into a test-tube. When the serum is clear 0·1 c.c. is pipetted into another test-tube, and 2 c.c. of a 7·5 per cent. solution of sodium carbonate is added. To this 0·4 c.c. of a solution of sodium phospho-tungstate is added, and a blue colour, varying in degree according to the uric acid in the serum, spreads beautifully throughout the liquid. The solution of sodium phospho-tungstate is made as follows: 100 grammes of sodium tungstate are dissolved in 80 c.c. of 85 per cent. phosphoric acid and 700 c.c. of water; the whole is boiled several hours and diluted to 1 litre. In using this test in Bright's disease the best method is to compare the colour of the reaction with a colour scale. By running through a large series of reactions with normal serum and serum of Bright's disease, I have made a colour scale, increasing in intensity from 10 to 100. To give examples of its use: two cases of nephritis with retention gave values corresponding to 70 and 80 on the scale. A colour corresponding to 80 and 90 is characteristic of nephritis, parenchymatous and interstitial. Experience will accurately class those cases which give the deepest colour. It is not easy to determine the corresponding quantity of uric acid. If we add the test solution to a standard solution of uric acid and lithium carbonate we find, however, that the colour produced by 5 c.c. of this solution corresponds to 1 milligramme of uric acid in 100 c.c.

Dr. Bartholow recognises that there are possible fallacies inherent to the test. If the serum con-

tains any hæmolytic products the reaction must be rejected. Too much serum must not be used, and the sodium carbonate solution should be added to the serum, not *vice versâ*. It is possible also, he thinks, that solutions of sodium phospho-tungstate may produce the blue colour with other as yet unknown substances. His own experience, however, of the test, which is a large one, disposes him to think that much may be hoped from it, and that it may be a means of throwing fresh light on some dark corners of Bright's disease.

TÆNIA NANA IN HOLLAND.

IN Holland, as in many other European countries, the infection of human beings with tapeworms is not rare. The tapeworm most often met with is *Tænia saginata*, a parasite half an inch wide and 30 feet or more in length, the intermediate host of which is the ox. Dr. C. L. de Jongh has recently described[1] a case of infection with *Tænia nana*, better called *Hymenolepis nana*, which is the smallest of the tapeworms found in human beings, and measures only about half an inch in length and a fiftieth of an inch in breadth. So small a parasite as this is no doubt often overlooked, and this may explain the rarity of its recorded discovery; thus in 1910 only four examples had been noted in Germany, one in England, and none in France, although an endemic infection of the Liége coal-workers in Belgium with it had been described by Malvoz in that year. Dr. de Jongh's patient was a little girl at The Hague, aged 2, sent to the hospital with wasting and diarrhœa. The diagnosis of gastro-enteritis was made, but the ova of *H. nana* were found in the stools in great numbers. Treatment with santonin was unsuccessful; the exhibition of 250 of the seeds of *Cucurbita pepo* followed by castor-oil gave a satisfactory result, and the child made a good recovery. Dr. de Jongh discusses the few facts that are known with regard to the life-history of this intestinal parasite, and concludes that it is not identical with the *Tænia murina* so often found in rats and mice. It is not known what animal serves as intermediate host to *H. nana*, but possibly the human host serves as the intermediate host as well. Investigating the stools of the other members of the patient's family, Dr. de Jongh found ova of this tapeworm in the excreta of the father and two other children, but not in those of the mother and the youngest child; these three carriers of *H. nana* all had a tendency to diarrhœa, but the mother and youngest child had not. Treatment with the seeds of *Cucurbita pepo* relieved the two children of over a hundred of the tapeworms each. Dr. de Jongh is not able to explain how these four members of this family came to be infected with this tapeworm; they had lived in the same house for five years, and none had been out of the country except the father, who had ten years previously lived in Duisburg for a few months.

Queen Alexandra has appointed Mr. Hugh Mallinson Rigby, F.R.C.S., surgeon to Her Majesty's Household.

THE late Lady Grenfell has bequeathed £1000 to the Hospital for Sick Children, Great Ormond-street.

[1] Nederl. Tijdschr. v. Geneeskunde, Amsterdam, 1917, i., 541.

MEMORANDUM UPON

SURGICAL SHOCK AND SOME ALLIED CONDITIONS.

THE phenomenon of oligæmia—or reduction of the volume of the blood in effective circulation—has figured prominently in the theories of surgical and traumatic shock (due, in the main, to American investigators) which have been current during recent years. There is no need to emphasise the importance at the present time of this condition, or that of the acute circulatory failure, similar to this in so many respects, which characterises some of the graver forms of infection and toxæmia. Information has reached the Medical Research Committee concerning some separate experimental inquiries into these conditions which are at present in progress on behalf of the Committee, and which promise to throw light on the production, by causes which have so little immediately obvious connexion with one another, of these groups of symptoms having so many points in common.

It appears to the Committee most desirable that clinical observations, bearing on the importance of the different suggested factors in the genesis of shock and allied conditions, should proceed concurrently with the further experimental investigations. They have, therefore, with the consent and aid of the investigators concerned—to whom they are greatly indebted—prepared the following preliminary notes for circulation among those having opportunity for clinical observation, and they have ventured to add some suggestions for the practical application of the results already gained, which seem to them worthy of attention and trial.

1. H. H. Dale and P. P. Laidlaw, whose primary object was a closer analysis of the shock-like phenomena produced by injection of various protein and bacterial poisons, of the sensitising antigen into an anaphylactic animal, &c., resumed, in the first instance, their examination of the action of the base β iminazolylethylamine ("histamine"), the shock-like action of which they described some years ago. Taking readings of the hæmoglobin value of the arterial blood with Haldane's hæmoglobinometer, or of the percentage volume of corpuscles in the blood with a hæmatocrit, they find that the profound fall of blood pressure produced by this substance is accompanied by a striking concentration of the blood, amounting in some cases to a loss of one-half the original volume of plasma in about five minutes. The liver appears to be the organ most actively concerned in this reduction of the plasma-volume; but it is not exclusively responsible, for the phenomenon occurs, though less regularly, when the drug is injected after exclusion of all the abdominal viscera. The concentration is apparently effected not merely by loss of water and diffusible constituents, but by the passage into the tissues and lymph-spaces of all the plasma constituents, since the protein content of the plasma does not rise in proportion to the reduction of volume.

If an animal, moribund from this type of shock, is opened, it is found that the heart is executing muscular beats of moderate vigour, although the arteries are pulseless. The veins are not distended and the great veins fill only very slowly from the periphery if clamped. A large part of the blood, in fact, has disappeared from effective circulation, and the weakness of the heart-beat is due to defective inflow from the veins.

The condition cannot wholly be explained by the loss of plasma-volume above described, for Dale and Laidlaw have several cases on record in which the drug produced a "shock" of some severity, with the general signs of oligæmia as above described, but with no loss of plasma, as measured by concentration of corpuscles, or a loss so small as to be quite inadequate to explain the effect. They further regard a loss of tone of the smaller arteries as insufficient to account for the extreme circulatory depression (the still incomplete evidence points rather to these being *constricted* in these circumstances), and provisionally attribute the shock in the first instance to a widening of the whole capillary area in the viscera and the musculature. The active contractility of the capillaries has been frequently described, and important evidence of its existence in man has just been provided by Cotton, Slade, and Lewis (Heart, 1917). Dale and Laidlaw suppose that, under the action of the poison, the capillary tone is lost, so that, the blood from the arterioles being diffused and stagnant among the slack capillary channels, the quantity of blood reaching the veins is inadequate for the filling of the heart. The cardiac output falls in consequence to a very low level.

An attempt will be made to test by direct experiment this hypothesis of circulatory stagnation as the result of general loss of tone of the capillaries. About the main fact—that there is a depletion of the macroscopic vessels both on the arterial and venous sides—there can be no room for doubt; and it will be obvious how this deficiency of blood-volume, relative to the total capacity of the system, will be aggravated by the direct reduction of the blood volume, owing to loss of plasma into the tissue spaces which usually accompanies it. The already sluggish circulation will be further impeded by the increase of the viscosity of the blood, mainly due to the increase in the proportion of corpuscles to plasma. This change of viscosity has been directly observed by Trevan *(vide infra)*. The slowness of the capillary circulation, again, through the muscles and other tissues needing a plentiful supply of oxygen, will lead to defective oxidation, with resulting acidity, and so to a further tendency for passage of water by osmosis from the blood, as suggested by Henderson. Lastly, the fall of arterial pressure, owing to defective filling of the chambers of the heart, and the increased viscosity of the blood, will so reduce the rate of the coronary circulation as eventually to interfere with the nutrition and oxygenation of the heart muscle itself. It will be seen, therefore, that when once the described condition is established a series of "vicious circles" is set up.

The determination of the change of plasma-volume from hæmoglobinometer readings may be illustrated by an example. From a cat (under ether) an initial sample of arterial blood gave a hæmoglobinometer reading of 80 per cent. When the profound shock produced by intravenous injection of 10 milligrammes of the biphosphate of histamine (about 3 milligrammes of the base) had fully developed—i.e., about seven minutes after the injection—a second arterial sample gave a hæmoglobinometer reading of 120 per cent. In order to translate these values into relative volumes of corpuscles and plasma, we must know the initial ratio of these volumes, and assume a constancy of hæmoglobin content in the corpuscles. The hæmatocrit showed that the corpuscles originally occupied one-third, and the plasma two-thirds, of the blood-volume, which is a normal ratio for a cat. The rise of the hæmoglobinometer reading from 80 to 120 per cent. must be taken to indicate an increase in the proportional volume of corpuscles in the same ratio. So that the percentage of corpuscles has risen from 33·3 to $33{\cdot}3 \times \frac{120}{80} = 50$. If the volume of corpuscles has remained constant this change of proportion indicates a fall of plasma-volume from 66·6 to 50 per cent. In other words, the plasma, which originally occupied twice as great a volume as the corpuscles, now occupies a volume equal to that of the corpuscles, so that one-half of the plasma has disappeared from the circulation. A hæmatocrit determination on the second sample actually showed the corpuscles and plasma occupying equal volumes, so that the assumption of a practically constant hæmoglobin content in the corpuscles was justified. The only means, other than the loss of one-half of the plasma, by which such a change could be effected would be a *doubling* of the number of red corpuscles in circulation, and it does not seem credible that this could occur in the course of a few minutes. It should be noted, further, that the arterial blood, on which the readings were made, represents a mixture of all the blood reaching the heart from the different organs. Blood taken from the portal vein when the shock-like condition has been produced shows an even greater concentration than that from the arteries, and even this portal blood contains an undue proportion of blood from those of the capillaries in the splanchnic area in which the circulation is still relatively effective. It must be supposed that in many the vanishing arterial pressure is no longer able to maintain a circulation, so that the blood in them is stationary and its concentration extreme.

Being impressed with the similarity of such a condition to surgical "shock," Dale and Laidlaw have made a short series of attempts to produce such a shock in anæsthetised cats by prolonged manipulation of the abdominal viscera, which, as Mann and others have pointed out, is the only method by which a traumatic shock can be produced in *Carnivora*. In two cases profound shock, with no tendency to spontaneous recovery, was obtained, and in both these such a rise of hæmoglobin value was observed, concurrently with the onset of the shock, as to indicate a serious depletion of the plasma-volume. In others a less profound shock was obtained, with a tendency to spontaneous recovery when the abdominal wound was closed and the animal left to itself under the anæsthetic; in these no significant change in the hæmoglobin value was observed. In these cases also the manipulated bowels became conspicuously reddened and ultimately blueish in appearance, but the blood pressure could be temporarily driven almost to its original high level by compressing the whole mass of intestinal coils, and so driving the blood out of their capillaries into the general circulation. In these cases, therefore, such shock as was obtained seemed to be due purely to stasis in the abdominal capillaries, as previously described by Mann.

Meanwhile, Captain Marshall, R.A.M.C., had commenced a series of observations in France on the hæmoglobin content of the blood in the different classes of case met with in a casualty clearing station. The Committee understand that among Captain Marshall's observations are some on shock, which support the view that loss of plasma into the tissues is an important factor in the condition.

2. β iminazolylethylamine (histamine) was chosen by Dale and Laidlaw for this investigation as a pure substance, producing effects of the kind under investigation in exact dosage. Effects of the same general type are produced by many products of protein digestion, bacterial products, &c. Among such effects those due to the so-called toxæmia of gas gangrene are of special importance at present. The resemblance between the symptoms of this condition and those of surgical shock or of a severe hæmorrhage has frequently been described.

An investigation is now being carried out by H. H. Dale and J. McIntosh into the symptoms presented by animals dying after a local infection of the limb muscles by organisms of the gas gangrene group isolated from material obtained from fatal human cases. The onset of a fatal shock-like condition in such experiments has again been found to be associated with a progressive rise in the corpuscular content of the blood pointing to a steady loss of plasma. It may be pointed out that such an effect was perhaps to be expected. The capillaries in the tissues surrounding the infected muscle are so affected that an enormous local outpouring of plasma occurs. Whether the general symptoms are due to passage of the infecting organisms into the general circulation or to the absorption through the lymph channels of toxic products of the local breakdown of muscle, effects on the general vascular endothelium of a similar kind, though much less in degree than those produced by the concentrated local action, might be expected. A general loss of capillary tone and a morbid increase of permeability of capillary walls might therefore be expected to result from absorption into the general circulation of the fluids from the infected area. The evidence as yet available confirms this expectation, and suggests that there is a fundamental similarity of origin, underlying the similarity of symptoms, between the toxæmia of gas gangrene and other shock-like conditions. It must be remembered, however, that failure of the heart from any cause will be attended by some degree of blood concentration if the process is sufficiently gradual. More work is needed before the significance of the phenomenon in these cases can be estimated with confidence.

3. Concurrently with the foregoing investigations, F. A. Bainbridge and J. W. Trevan have been conducting an investigation into the genesis of shock by other means, and the same factor of concentration of the blood has presented itself in their observations. Their experiments hitherto have been mainly concerned with the effects on the portal and systemic venous pressures and on the general distribution of blood in the circulation, produced by repeated injections or by long-continued, slow infusion of adrenalin. The inquiry was suggested by the fact, demonstrated by Elliott, Cannon, and others, that extreme emotion or severe pain, which are factors in some cases of shock, are accompanied by an outpouring of adrenalin from the suprarenal glands. Bainbridge and Trevan have injected adrenalin slowly into a systemic vein in anæsthetised dogs for 20 minutes or longer, at a rate sufficient to maintain the arterial pressure at a supranormal level comparable with that attained during moderate stimulation of a sensory nerve. During the injection the portal pressure rose to, and remained at, a high level, while the systemic venous pressure was not significantly altered or even fell slightly. Meanwhile readings with the hæmoglobinometer and the hæmatocrit showed a steady decrease in the volume of the blood-plasma relatively to that of the corpuscles. In one case the hæmoglobin value rose from an initial 95 per cent. to 129 per cent. Such a relative increase of corpuscular content would involve a large increase in the viscosity of the whole blood; an actual determination showed an increase of viscosity in the proportion of 6·8 to 9·1.

When the injection of adrenalin was stopped, the arterial pressure rapidly fell to a low level while the portal pressure remained high, and the animal passed into a condition of shock, with feeble pulse and shallow respiration. The relation of the portal and systemic venous pressures indicated an obstruction of some kind to the flow of blood through the liver. This was made further evident, in the later stages of the effect, by the striking turgidity of the liver itself. If the flow of lymph from the thoracic duct was recorded, it was observed to undergo a striking acceleration, as the obstruction in the liver developed in consequence of the infusion of adrenalin. The nature of this obstruction is not yet clear, and will be the subject of further investigation. Its effect, especially after the cessation of the inflow of adrenalin has allowed a dilatation of the splanchnic arterioles, is a collection of a large part of the blood in the congested splanchnic area. When to this is added the

steady loss of fluid from the blood by exudation into the tissues, it will be seen that the final result, as regards the activity of the heart and the general circulation, will be closely similar to that described above in connexion with Dale and Laidlaw's experiments. The failure of the output of the heart from defective venous inflow, due to reduction of the volume of blood in effective circulation, leads to a profound collapse of the arterial pressure; the loss of plasma into the tissues not only aggravates this defect of volume, but, by increasing the viscosity of the blood, further retards such flow through the capillaries as the low arterial pressure could otherwise maintain; and this retardation yet further checks the venous inflow to the heart. The blood travels very slowly round the body under such conditions, and the supply of oxygen to all the tissues becomes inadequate. This inadequacy is accentuated by defective oxygenation of the arterial blood, which remains dusky in colour even with artificial respiration.

4. *Some Practical Suggestions and Inquiries.*

(A) The point of most novel interest emerging from the above notes is the importance which the different sets of workers attribute to loss of plasma into the tissue spaces, as a factor in the production of the circulatory failure. The presence of such a factor was suggested by Henderson, Mann, and others, but its extent and significance have hitherto been rather vaguely indicated. Such loss of fluid from the blood, causing both deficient volume and excessive viscosity, has for some time been clinically recognised as an essential factor in the collapse occurring in conditions like those of cholera and bacillary dysentery, in which the fluid is lost through more obvious channels.

It is here suggested that clinical observation on changes in plasma-volume in traumatic shock, post-operative shock, and the toxæmia of gas gangrene may yield valuable information. The only instruments clinically applicable to the detection of such changes are the hæmoglobinometer and the hæmatocrit. It will be evident that the interpretation of such observations will be a more complicated matter than that of results obtained under the controlled conditions of experiment; for an estimate of the plasma-volume by these methods depends on the assumption that the volume and hæmoglobin content of the red corpuscles remains constant. It cannot, for example, be expected that a loss of plasma occurring in shock consequent on an extensive wound, with much hæmorrhage, will be accompanied by an absolutely high hæmoglobin-value or hæmatocrit reading. Again, in a protracted case of toxæmia from gas gangrene, the observation will be vitiated by the probability that, though plasma may be draining from the vessels into the tissue spaces, a coincident destruction of red corpuscles is taking place. It is hoped, however, that a careful selection of suitable cases for observation, and attention rather to change of the corpuscular content, as shown in a series of observations at short intervals, than to the absolute initial value, will enable information to be obtained as to the significance of this factor. It may be suggested that cases of traumatic shock without serious hæmorrhage, of post-operative shock, of intestinal obstruction, of extensive burning, of anaphylactic shock, and of the rapid, fulminating type of toxæmia from gas gangrene, are likely to give relatively uncomplicated data for this purpose.

(B) The experimental results suggest that the removal of blood from effective circulation may be brought about in more than one way. It would be of interest to know whether different types of shock can be clinically recognised; in particular, whether a type with circulatory obstruction in the liver, as shown by swelling of this organ and congestion of the portal vein and its tributaries, can be differentiated from a type without this feature; and, if so, whether the nature of the primary cause of the shock has any relation to the type produced.

(C) *Prevention.*—If shock is, indeed, due to oligæmia, its many points of similarity to the collapse produced by a dangerous hæmorrhage need no explanation. It will further be obvious that an antecedent hæmorrhage, insufficient in itself to produce collapse, may be an important factor in the subsequent onset of shock, in so far as this condition is due to defective volume, apart from increased viscosity of the blood. The normal reaction to a simple hæmorrhage, of sufficient severity to diminish the output of the heart and lower the blood pressure, consists in the abstraction of fluid from the tissues until the volume of the blood is again adequate to maintain the cardiac output. Dale and Laidlaw find that a similar dilution of the blood normally accompanies, and tends to correct, a fall of pressure due to arterial dilatation. In shock, according to the indications of the experiments already described, this restorative reaction fails completely and fluid continues to pass from the blood, though the arterial pressure has fallen to a very low level. It will be evident, therefore, that when shock is already imminent a relatively small hæmorrhage may have a serious influence in determining its onset. Any other causes tending to diminish the blood volume, such as fatigue, exposure, or prolonged abstinence from food and water, may be expected to predispose to shock for a like reason. Mention should be made also of the possibility that measures preparatory to an operation in hospital, if they include free saline purgation and severe abstinence from food and water, may contribute to the danger. Cases for urgent operation must constantly present themselves to the military surgeon, in which the antecedent conditions are those mentioned above as tending to depletion of the blood volume, and therefore predisposing to shock. A free supply of fluid, by infusion of physiological saline into the rectum or the subcutaneous tissues, as already used by many surgeons, may be expected to have a special preventive value in such cases. The indications, however, are that such measures, to have any value, must be begun before or early in the operation. When once the condition of shock has been developed, physiological saline, or Ringer's solution, even if injected intravenously in large volume, appears to have a very limited and temporary value; for the diluted plasma passes with increased rapidity through the slack and permeable walls of the capillaries, and the fluid leaves the circulation almost as quickly as it is run in.

(D) *Treatment.*—Unfortunately, little can be said as yet as to the treatment of shock and allied conditions when once developed. Suggestions only can be made of measures which may be tested with possible advantage and without danger. It is hoped that further experiment may warrant more positive recommendations at a later stage. Pituitary extract causes a prolonged and general contraction of the arterioles, and thereby diminishes the total capacity of the circulatory system and mitigates the effect of deficient blood-volume. The tendency of adrenalin to produce obstruction to the circulation through the liver, as described above, makes it probable that the use of this substance would, in some cases, eventually aggravate the condition which it was designed to cure; its action is, in any case, so fugitive as to be of little value. The action of pituitary extract is free from both these drawbacks; its value in some cases is already well recognised, and, with the ordinary measures for restoring and conserving the body temperature, needs no further mention.

The failure of injections of physiological saline in fully developed shock has already been mentioned. Experiments already made seem to indicate that better results might be obtained by the use of intravenous injections of hypertonic saline, the value of which in the treatment of cholera and bacillary dysentery is already familiar. Whether the action of these is entirely due to the passage of water into the vessels by osmosis, or in part to a restorative effect of the hypertonic solution on capillary tone, is not clear. In this connexion it may be recalled that calcium ions have been found to have a specific action in reducing abnormal permeability of capillaries (*cf.* Wright; also several papers from the Vienna school). It seems reasonable, therefore, to suggest that a fluid representing a concentrated Ringer solution should be used rather than one in which only the proportion of sodium chloride is increased. The following formula might be tried—

Sodium chloride	2 grammes.
Potassium chloride	0·05 ,,
Calcium chloride	0·05 ,,
Water	100 c.c.

and the value of increasing the relative calcium content beyond this proportion might cautiously be tested.

The deficient oxidation occurring in any condition of circulatory failure will lead to an abnormal acidity of the tissues, and thereby tend to raise the concentration and viscosity of the blood in the capillaries. Administration of alkalies should, therefore, help to relieve the condition, and injections of sodium bicarbonate, as recommended by Wright for the treatment of gas gangrene, should form a valuable addition to large injections of a hypertonic saline mixture. The limited solubility of calcium bicarbonate makes it advisable to give the bicarbonate solution as a separate injection. Hogan and Fischer recommend the following formula for an alkaline hypertonic saline:—

Sodium chloride	28 grammes.
Sodium carbonate (crystalline) ...	20 ,,
Distilled water	2 litres.

Bayliss recently drew attention to the importance of the factor of viscosity in solutions used to replace blood lost by hæmorrhage. He considered that gum acacia was a suitable substance to add to saline for such purposes, as imparting the requisite viscosity and as being a colloid with a definite osmotic pressure. Hogan and Fischer, on different theoretical grounds, have recommended the addition of 2 per cent. of gelatin to a saline solution for intravenous infusion. It will be evident, from what has been said above, that the aim in treating shock should be restore the volume of blood in effective circulation, and at the same time to reduce the abnormal viscosity. While, therefore, a small addition of gum to the saline fluid used for injection may be valuable, the proportion of 7 per cent., suggested by Bayliss, as

bringing the viscosity of the saline up to that of normal blood, would be unduly high. An addition of 2 or 3 per cent. of gum acacia to the saline solution above suggested might be tried; but it will be possible to make more definite recommendations when there has been time for experiment with solutions of different formulæ.

The defective oxygenation of even the arterial blood, in experimental shock as above described, suggests that inhalations of oxygen may have some value in these conditions.

The Medical Research Committee, whose address is 15, Buckingham-street, Strand, W.C. 2, will receive gratefully any reports upon clinical studies or experimental observations which may be sent to them as bearing upon the questions raised in this Memorandum. They hope it may be possible later to issue a further Memorandum, or series of reports, in which further results of the inquiries now in progress may be given, together with such relevant clinical observations as may then be available.

PUBLIC DENTAL SERVICE.

THE particulars follow of certain dental clinics which have been established in various centres to provide proper dental treatment for adult patients whose incomes are below £160 per annum. It has not yet been found possible to arrange for dental benefits under the National Insurance Act, and as (in the present state of the finances of the country and of the Act) such treatment is not likely to be provided under a State-aided scheme, it is important to consider carefully what can be done by voluntary means to meet the needs of this class of patient. The schemes show that where these clinics have been established much good work has been accomplished in various important centres. They have generally been inaugurated and worked by the dental surgeons in the central town, apparently often as an incorporated body under the Companies Acts, so that the financial liability of the members is limited. In most cases it expressly stated that all the dentists in the locality favour the scheme; doubtless, many of the out-patient attendances must be made by the younger practitioners, but it is a matter of great importance that all the practitioners in the area, both medical and dental, should take a friendly interest in the movement. The anæsthetics are administered by the local medical practitioners, and they should be represented on the local committees. It is interesting to note that in several districts the dentists consider the £160 income limit too high. In Bournemouth the income limit is fixed at £120 per annum; in Glasgow it is £104; in Nottingham there is a sliding income scale, with a different rate of fees for each class of income.

It is to be hoped that these clinics will not simply serve for the extraction of teeth and for the supply of artificial dentures, but that the preventive side of dentistry will be kept well in view. The excellent work which is begun in so many elementary school dental clinics should be carried on in these clinics for adults, which may also be made most useful centres for the spread of simple instruction in mouth hygiene, while forming an excellent medium for combating unqualified dental practice.

DENTAL CLINICS.

The *Brighton and District Public Dental Service* was founded in 1907 to provide treatment by qualified and registered dentists for persons unable to pay the usual fees, for those entitled to medical benefit under the National Health Insurance Act, and for others with an income not exceeding £160 per annum. The service uses the premises of the Brighton, Hove, and Preston Dental Hospital at 27, Queen's-road, Brighton, a moderate rental being paid to the hospital. There are two well-equipped surgeries, with the necessary waiting-rooms and offices. A member of the staff is in attendance during five evenings in the week. At present 27 dentists are on the list of the active staff, but most of the members of the profession in the district are associated with the service. Patients may select their own dentist, and are seen either by appointment at his house or at the rooms of the service. Fees are payable in advance at the office, but may be remitted in instalments. The takings are distributed quarterly to the members of the staff who have done the work after deduction of a percentage for administrative expenses. The Service undertakes all the dental treatment provided in the district by the Domestic Servants' Insurance Society for its members. It received grants amounting to £123 for work done for the Soldiers' and Sailors' Dental Aid Fund until the closing of this Fund in January, 1916. Its scale of fees has been adopted by the East Sussex Insurance Committee as the basis of payment for dental treatment on account of sanatorium patients. From year to year there has been a steady, though slow, increase in the number of patients treated by the Service. The slow growth may be attributed to the absence of advertising which naturally places the Service at a disadvantage with the numerous unregistered practitioners who compete at equally low, or even lower, fees.

The present tariff is as follows:—

Ordinary extraction	1*s.*
Extraction with local anæsthetic	2*s.* 6*d.*
Extraction with nitrous oxide gas	5*s.*
Filling	2*s.* 6*d.*
Filling, with root treatment	5*s.*
Scaling	2*s.* 6*d.*
Artificial teeth:	
Upper denture, from	10*s.* to £2
Lower ,, ,,	10*s.* to £2

The *Reading and District Public Dental Service* (Central office, 22-25 Chain-street) is affiliated to the Borough of Reading Medical Society, Limited, and was started in 1912. The Dental Service is an association of all the legally qualified dental practitioners in the borough, and is intended for those who are unable to pay ordinary fees, and who are either (*a*) subscribers to the Borough of Reading Medical Society; (*b*) insured persons attended by medical officers of the above society; or (*c*) persons residing in the neighbourhood of Reading who are subscribers to the Public Medical Service, or insured persons attended by medical officers of that Service. Each patient may select the member of the Service by whom he desires to be attended, but it is open to each member to limit the number of patients whom he will consent to attend, or decline to attend any individual patient. Fees are payable in advance and those for prosthetic treatment can be settled in instalments. The total fees approximate to £1000 per annum. The minimum and maximum fees are as follows:—

Extractions (ordinary)	1*s.*
Extractions (with anæsthetic)	2*s.* 6*d.* to 5*s.*
Special operations	3*s.* 6*d* to 5*s.*
Dentures (vulcanite):—	
Large or full upper or lower	£1 10*s.* to £3 each.
Medium or small upper or lower	10*s.* to 30*s.* each.

The *Bournemouth and District Dental Clinic, Ltd.*, was started in 1913 with a centre at "Edgemoor," Old Christchurch-road, Bournemouth, with the object of providing dental treatment, both surgical and mechanical, for patients of limited income. Twenty-two qualified dental surgeons of Bournemouth and district share the attendance at the clinic, of which the hours are 9 A.M. to 7 P.M. and 9-1 on Saturdays. Anæsthetics, when required, are administered by medical men. The fees charged vary according to the weekly income of the applicant, and in cases of married people according to the number of children dependent upon them, but no person having a larger income than £120 per annum will be eligible for treatment. After working for a short while in order to gain experience a limited liability company was formed, the shareholders being limited to qualified dental surgeons, and five directors act as a committee of management. Expenses are met out of revenue, and after paying a fixed rate of interest on capital the balance is allotted half-yearly *pro rata* to the members who have done the work.

The *Public Dental Service in Glasgow* was inaugurated in 1913-14 on the lines of similar public services in the south of England, with the object of placing the highest dental skill and the best material within the reach of the less well to do. The Scottish Dentists' Association, Ltd., was incorporated on April 9th, 1914, under the Companies Act, in order to afford adequate protection to the members of the service. Under the memorandum and articles of association there can be no division of any profits amongst the members. Any surplus profit has to be used for extension of public dental services or kindred objects. The initial funds, amounting to £400, were subscribed by guarantee of members, who now number about 130. The first clinic was established in the Partick district of Glasgow in November, 1913; the second in Crown-street, in

the south-east district of Glasgow, in January, 1914; the third in Hamilton, a town ten miles south of Glasgow, the centre of a large industrial population, in July, 1914. These were fitted out on a common plan, including operating-room, waiting-rooms, and a room for lady attendant. The evening being the most suitable time to get into touch with the class for whom the service is intended, the rooms are open from 5 to 9 P.M. Between 5 and 7 P.M. the attendant receives patients and makes appointments, while from 7 to 9 P.M. the operators are in attendance each day except Sunday. Six dentists undertook to attend at each clinic, and they are supported by an adequate relief staff. It was laid down that the clinics were for the treatment of patients whose income did not exceed £104 per annum, the income standard of £160 under the National Health Insurance Act being held to be too high.

Local medical practitioners in the various areas have supported the clinics and expressed their appreciation of the service. About 2550 patients have been treated up to date, but since the commencement of the war the natural development of the clinics has been checked. Among the patients the alteration of hours of employment and restriction of lighting have conduced to a falling off in attendance, and many of the operators have gone on active service. The Hamilton branch, which was peculiarly affected by economic conditions, has been closed. On the outbreak of war three clinics, with a staff of 60 operators on day duty, were placed at the disposal of the military authorities. Gratuitous service was given in order to render dentally fit many recruits who would otherwise have been rejected, and during four months about 700 men attended for extractions, fillings, and dentures. The smallness of the number of recruits treated was probably due to the fact that the men could not be spared from training and were also frequently on the move. Subsequently, at the request of the Scottish Command, the association undertook to organise as a recognised centre the dental treatment of soldiers in Glasgow and a district including the counties of Lanark, Renfrew, Dumbarton, Ayr, and the town of Falkirk. During one year 6000 soldiers attended. 20,000 extractions, 6000 fillings, and the provision of 1500 dentures was carried out.

The minimum scale of fees was fixed at :—

Extraction without anæsthetic	6*d.*
,, with local ,,	1*s.*
,, with nitrous oxide	3*s.* 6*d.*
,, with other general anæsthetics	10*s.* 6*d.*
(Plus anæsthetist's fee.)	
Fillings	3*s.* 6*d.*
,, with root treatment	1*s.* 6*d.*
Scaling	2*s.* 6*d.*
Dentures: Partial, per tooth	3*s.* 6*d.*
Minimum	7*s.* 6*d.*
Full upper or lower	£2 5*s.*
,, ,, ,, with ext.	£2 10*s.*

The *Nottingham Qualified Dentists Public Service* was inaugurated in June, 1914, as a result of meetings held by the local branch of the British Dental Asssciation, to which all registered dentists in Nottingham and district were invited. The premises are centrally situated at 2, Stratford-square, Shakespeare-street, Nottingham, and comprise a well-equipped surgery as well as anæsthetic room and the usual offices. There are 5 honorary and 16 active members, the latter attending daily from 9 A.M. to 8 P.M., except on Tuesdays and Fridays, when the Service is closed from 2 to 6 P.M. Dental treatment is provided for persons whose average weekly income does not exceed 50*s.* Applicants are placed in three classes: A. Those whose income does not exceed 25*s.* weekly; B. Those with incomes of from 25*s.* to 35*s.* weekly; C. Those with incomes of from 35*s.* to 50*s.* weekly—the fees varying accordingly, payable in advance and in small instalments if desired. There is free choice of dentist from the list, but no change can be made for the period of one year. Patients are seen at the dentist's private house as well as at the clinic. When war broke out, the organisation of the service was placed at the disposal of the local military authorities, and dental treatment was given free, until a scale of army fees was established, to men who would otherwise have been rejected for the army. The battalions raised by the local Parliamentary Recruiting Committee received dental treatment, more than 3300 patients being treated with 14,000 extractions and 7500 fillings. Up to September, 1916, the number of private patients treated by the service amounted to 365, with 1624 extractions, 206 fillings, and 172 dentures. The Service is now officially recognised as the centre for army dental treatment in Nottingham, for the wounded in hospital, and for billeted troops. A dental clinic was formed in the summer of 1915 to provide dental treatment at a camp 20 miles from Nottingham. Two dentists from the service attended daily on five days a week. Members have also visited camps in the district to help the military authorities with work urgently needed. The council is at present considering ways and means of bringing the Service to the notice of those persons for whom it was intended. Public dental services, although organised for the benefit of the working classes, at present have no means of gaining publicity other than by recommendation from patient to patient.

The *Birmingham Qualified Dentists Public Service* was started in 1916 at 9, Great Charles-street, Birmingham, to give dental service to persons whose income does not exceed £160 per annum and who are unable to pay ordinary fees. Any qualified and registered dentist practising in Birmingham and district, if a member of the British Dental Association, is eligible for election as a member of the Service. The number of members is limited to 20. The management of the Service is in the hands of a committee consisting of the members and honorary associates for the time being, with an executive committee made up of the officers and five unofficial members. Any patient entitled to the benefits of the Service may select the member by whom he desires to be attended, but each member may limit the number of patients whom he will attend or decline to treat an individual patient. Minimum fees are fixed, payable in advance or by instalments in the case of prosthetic treatment. These are as follows:—

Ordinary extraction ... ... 1*s.* per tooth.
Local anæsthetic ... ... 2*s.* 6*d.* and 1*s.* per tooth after at same visit.
Gas ... ... 3*s.* 6*d.* and 1*s.* per tooth afterwards, maximum 10*s.* 6*d.*
Scaling ... 2*s.* 6*d.* to 5*s.* per sitting. Subsequent visits 2*s.* 6*d.* per visit.
Fillings, plastics, 2*s.* 6*d.*, 3*s.* 6*d.*, 5*s.* (according to cavity).
,, root fills, 7*s.* 6*d.* to 10*s.* 6*d.* (including filling).
,, porcelain inlays, 7*s.* 6*d.* or 10*s.* 6*d* (root filling 2*s.* 6*d.* extra).
,, gold 10*s.* 6*d.* and upwards (root-filling 2*s.* 6*d.* extra).
Crowns from 15*s.*
Dentures, £3 10*s.*, £5, and £6, according to style of denture.
Complete upper or complete lower dentures, £2. £2 10*s.*, and £3.
Partial dentures, 3*s.* 6*d.* to 5*s.* per tooth, min. 10*s.* 6*d.*

THE BELGIAN DOCTORS' AND PHARMACISTS' RELIEF FUND.

SUBSCRIPTIONS.

THE following additional subscriptions to the Fund have been received :—

	£	*s.*	*d.*
Sale of ladies' jewellery (per Dr. Colquhoun, Dunedin, N.Z.)	5	0	0
Dr. W. W. David	2	0	0
"La Tricalcine"	8	19	8
Mr. J. Y. W. MacAlister	5	0	0
Dr. G. D. H. Carpenter (23rd donation—total, £23)	1	0	0

Subscriptions to the Fund should be sent to the treasurer of the Fund, Dr. H. A. Des Vœux, at 14, Buckingham Gate, London, S.W., and should be made payable to the Belgian Doctors' and Pharmacists' Relief Fund crossed Lloyds Bank, Limited.

THE APPEAL FOR SURGICAL INSTRUMENTS.

Surgical instruments should be sent to the Master of the Society of Apothecaries, Apothecaries' Hall, Blackfriars, E.C.

THE CAMPAIGN AGAINST VENEREAL DISEASES IN BELFAST.—A Belfast correspondent writes: "The educational subcommittee of the Belfast branch of the National Council for Combating Venereal Diseases have arranged for courses of lectures to be given to teachers—men and women being separately addressed—social workers, and nurses, while a conference of the clergy to consider the question in its moral aspects has also taken place. All these plans are in line with the recommendations of the Royal Commission on Venereal Diseases, but thoughtful people are asking the question, Has education of the public ever yet stopped any epidemic? and the reason for such a reflection is that such a method only reaches those already convinced. The real enemy is never unmasked in this way, and until we adopt in civil practice what has already been done in the Army, both at home and abroad, actually *since this war broke out*—namely, notification, compulsory isolation, and treatment—it is hopeless to expect any real progress. It is unfortunately the case that audiences destitute of any medical training, after listening to lectures on venereal diseases, often take up entirely erroneous ideas, and in the end little real permanent good is accomplished."

PARIS.

(FROM OUR OWN CORRESPONDENT.)

The Treatment of Gas Asphyxia.

Dr. Chassevant has recently explained the treatment he adopts in his ambulance for the victims of gas asphyxiation, which has given good results in his hands. The patients reached the ambulance, which was acting as evacuation hospital for the first line, from two to eight hours after being gassed. Some had already received first aid at a dressing-station or at other ambulances; some came straight from the trenches. All were subjected, at several sittings with intervals between, to the rhythmic inhalation of oxygen under pressure. Dr. Chassevant holds that oxygen inhalation as usually administered with an indiarubber bag has no efficacy; it is essential actually to insufflate oxygen on the lines of Dr. D'Arsonval's treatment of carbonic oxide intoxication. An india-rubber catheter is introduced far back into the buccal cavity, directly connected with the cylinder of compressed oxygen (such as is available at the pharmacies as reserve oxygen); by opening and shutting the regulator key active rhythmic insufflation at the rate of 15 or 16 to the minute is brought about. This treatment calms the dyspnœa, favours pulmonary aeration, and may be regarded as a true mechano-therapy treatment of the lung. Doctors and pharmacists who have been accidentally subjected to chlorine inhalation in the laboratory or on the field know how painful is the effort of inspiration; it is just this effort which the inhalation of compressed oxygen renders unnecessary. To combat the cardiac weakness Dr. Chassevant accompanies the inhalation of oxygen with subcutaneous injection of camphorated oil in large doses, 5 to 15 c.c. or more in 24 hours, as occasion requires. The author states that this method of treatment has been adopted by all to whom he has explained it. Oxygen under pressure is, in his view, the true antidote to intoxications arising from inhalation, assuring as it does the proper ventilation of the lungs. It is therefore desirable for every ambulance and dressing station to have at disposal several small and easily managed cylinders of compressed oxygen under pressure; they might even be available in the shelter-posts along with the portable fire-extinguishers.

Fractures of the Humerus in Grenade-throwers.

M. Chaput has reported to the Surgical Society the observations of MM. Kas and Rouéche on fractures of the humerus in grenade-throwers, specially frequent in the case of the instructors—i.e., men who have frequently repeated the same movement. The mechanism is the usual one of fracture by muscular violence; the humerus breaks by flexion inwards. In one case the length of the internal fragment allowed the movement of the arm to be completed. These fractures are presumably of quite spontaneous occurrence. Syphilis may play a part; but union occurs within a normal period.

Parasitic Hæmoptysis in the Yellow Races.

MM. Salomon and Neveu have found, in the bloody expectoration of a native of Annam who showed signs of generalised afebrile bronchitis with apical congestion, the valvular eggs of a fluke, the *Paragonimus westermanni* (*Distoma pulmonale*). The eggs contained pigment, and were clustered in groups of 30 to 40. The expectoration also contained cocci, erythrocytes, and numerous eosinophiles. An eosinophilia of 7 per cent. was present in the circulating blood. Radioscopy indicated the existence of fairly well-marked enlargement of the hilus glands. The authors place this case in the same category with three other cases of recurrent hæmoptysis in Indo Chinese who had no stethoscopic signs of pulmonary bacillosis, nor any obvious lesions of the air tubes, but presented clinical signs of bronchitis accompanied by emphysema. The expectoration consisted of scanty coloured pellets floating in abundant sanguinolent mucus. Pulmonary distomiasis or infection with *Paragonimus westermanni* is endemic in the Far East and in those parts of North America inhabited by Chinese or Japanese. The condition is frequently accompanied with bronchitis or bronchiectasis. It may give rise to cavitation and simulate pulmonary tuberculosis, both in auscultatory signs and in the resulting cachexia. The parasite is frequently harboured and disseminated by domestic animals—the pig, dog, and cat. The presence on the French front of native soldiers and labourers from the Far East should direct the attention of medical men to these carriers of flukes, who are certainly numerous and might give rise to endemic distomiasis in France. Cases of protracted bronchitis with or without hæmoptysis which have been in contact with the subjects of pulmonary distomiasis must be held suspect. Microscopical examination of the sputa, by establishing the existence in abundance of the characteristic eggs of the *Paragonimus*, permits of the prompt isolation and discharge of the infected person. It is important not to overlook these cases, which in the Far East give rise to considerable sickness and mortality.

March 27th.

CANADA.

(FROM OUR OWN CORRESPONDENT.)

The Medical Profession in Canada and the War.

ACCORDING to a statement recently issued by Sir Edward Kemp, Canadian Minister of Militia and Defence, the Canadian Army Medical Corps number approximately 1800, of whom 500 are in Canada and the balance serving overseas. A large proportion of those in Canada are carrying on the work of the Canadian Military Hospitals Commission. In addition to the above numbers there are 400 civilian practitioners partially employed in military work in Canada, and over 400 Canadian doctors have proceeded overseas to join the Royal Army Medical Corps. In a short time other physicians in the Dominion desirous of serving will be given an opportunity of assisting in the work of attending invalided soldiers returning to Canada. That work is now to be divorced from the Canadian Hospitals Commission and assumed by the Canadian Army Medical Corps, under the direction of a Director of Medical Services for Invalids, Commission continuing the provision of hospital accommodation as it is needed, and the maintenance and equipment thereof. Colonel Frederick W. Marlow, A.D.M.S., has made an official report to the Militia Department on the general arrangements of the Canadian Army Medical Corps. Travelling all over Canada, Colonel Marlow's work of inspection had a wide scope. His report has been considerably discussed since the Canadian Government made it public property. In general, Colonel Marlow recommends: The completion of the reorganisation of the Medical Service, thus bringing the medical branch of the service up to the required standard; the increasing of administrative staffs; the appointment in some districts of officers brought back to Canada from overseas; consideration of the advisability of increasing the Permanent Army Medical Corps for duty in Canada; frequent inspections of all districts and camps, for which purpose the appointment of an inspecting officer would seem advisable; depôt units of fixed establishment to replace or supplement the present reinforcement plan, and closer relation between home and overseas service so as to minimise wastage; a plan whereby specialists may proceed overseas without undue delay in Canada; the gradation of officers entering the service, so that experience and special ability will count; the advisability of providing term contracts for service; improvement of laboratory facilities; installation of fumigating plants at camps and military hospitals; close coöperation between the Canadian Hospitals Commission and the Canadian Army Medical Corps; and the establishment of large hospitals in Halifax, Quebec, Montreal, Toronto, Winnipeg, Edmonton, and Vancouver. One of the recommendations, that of the transference of the returned soldiers to the Canadian Army Medical Corps from the Hospitals Commission, has already been adopted.

The Freedom of the Canadian Expeditionary Force in Canada from Enteric Fever.

The Provincial Board of Health for Ontario has supplied to date all the typhoid and paratyphoid vaccine used by the entire Canadian Expeditionary Force, about 450,000 men. In all, nearly 600,000 doses have been supplied free of cost. The Department of Militia and Defence have just announced that for the 12 months ending Dec. 31st, 1916, 167 cases only of typhoid fever were reported as having occurred amongst the thousands of men of the C.E.F., and this notwithstanding the fact that typhoid fever is a disease especially affecting young adults from 17 to 30 years of age,

and a disease which is endemic in all parts of Canada. This comparative freedom on the part of the force is seen to be most striking when it is recalled that, during the Boer War, one man out of every nine in the British Forces in South Africa was invalided through this disease, and that in the Spanish-American War, of 107,000 men in the camps at Tampa, Florida, and elsewhere, who had not left the shores of the United States, 20,000 contracted the disease. The remarkable change can only be attributed to the process of inoculation, and Dr. John W. S. McCullough, chief medical officer of health of the Province of Ontario, may be congratulated on the good results of systematic work.

Canadian Medical Association.

It has been decided to resume the annual meetings of the Canadian Medical Association, which have been suspended since the beginning of war in 1914. Dr. J. W. Scane, registrar of the Medical Faculty of McGill University, has been acting as general secretary since the departure of Dr. W. W. Francis for overseas service. Dr. A. D. Blackader has been elected President. The Past-President, Dr. Francis J. Shepherd, will deliver the address in surgery, and Dr. A. Mackenzie Forbes, who has recently returned from the front, has been appointed chairman of the Military Section. He has been promised a number of interesting papers from Canadian surgeons at present in England and France. The annual meeting is to be held in Montreal in the middle of June.

McGill University and the War.

The 43 graduates of class '17, McGill University, in medicine, have volunteered in a body to go overseas. Twenty-four are in a position to go overseas immediately, and the balance have started training. Old boys and present boys to the number of 1800 have been serving their King and country in the present great world conflict. Of those who have gone 132 have made the supreme sacrifice, and 163 have been wounded. One of the faculty has received the Victoria Cross, four the D.S.O., one C.M.G., one the Order of the Bath, and seven have been mentioned in despatches. Amongst professors and graduates who had recently had their names brought to the attention of the Secretary of State were Lieutenant-Colonel F. G. Finley, Captain James R. Goodsall, Colonel Lorne Drum, Major Lewis E. W. Irving, and Captain G. C. Hale.

Medical Inspection of Schools in Toronto.

About a year ago it began to be felt in Toronto that there was a waste of money in having medical inspection of school children conducted under the Board of Education. The City Council unanimously passed a resolution favouring the placing of medical inspection under the administration of the Board of Health. Although numerous conferences were held between the Board of Health of Toronto, the Board of Education, and the Provincial Government, no definite and satisfactory arrangement could be arrived at, as the Board of Education was strong for retaining the system they had adopted under their own immediate management. Ultimately the matter has been laid before the electors, when the people, by an overwhelming majority, voted in favour of medical inspection being placed under the Board of Health. Legislation will be sought at the present session of the Ontario legislature to provide for the transfer of responsibility.

Toronto, March 5th.

ROYAL SOCIETY OF ARTS: INDIAN SECTION.—At a meeting of the section held on March 27th Sir Havelock Charles, President of the Medical Board of the India Office, read a paper by Surgeon-General Sir C. Pardey Lukis, Director-General, Indian Medical Service, on Opportunities for Original Research in Medicine in India. The paper stated that there would shortly be two schools of tropical medicine in India—one at Calcutta and the other at Bombay. The former would be opened under the directorship of Sir Leonard Rogers as soon as the cessation of hostilities enabled them to furnish the necessary staff. The latter was associated with the Bombay Bacteriological Laboratory at Parel and was also approaching completion. The Government of Madras also had under consideration a scheme for founding a pathological institute in connexion with the Madras Medical College. Mr. Austen Chamberlain, who presided, appealed to the leaders of the medical profession in this country to make themselves acquainted with the opportunities offered by India, and not to grudge sending to India some of the best pupils they could produce.

THE SERVICES.

ROYAL NAVAL MEDICAL SERVICE.

THE following appointments have been notified:—

Fleet Surgeons: M. H. Knapp to *Inflexible*, and C. C. Macmillan, D.S.O., to *Blake*.

Temporary Surgeon: M. Neilson, to *Vivid*.

ROYAL ARMY MEDICAL CORPS.

Col. J. Turton (T.F. Res., A.M.S.) to be temporary Major.

Lieut.-Col. J. G. Gill to be acting Colonel whilst employed as Deputy Director of Medical Services of a Division.

To be acting Lieutenant-Colonels: Major F. E. Roberts, D.S.O., whilst commanding a Stationary Hospital; Major E. F. Q. L'Estrange whilst commanding a Field Ambulance.

Major Sir J. Bland-Sutton, R.A.M.C., T.F., to be temporary Honorary Lieutenant-Colonel.

Capt. E. W. H. Groves, R.A.M.C., T.F., to be temporary Major.

Temporary Lieutenants to be temporary Captains: T. Mulcahy, J. M. N. Paton, W. A. Berry, W. S. Melville, A. T. Gibb, E. H. Cameron, H. V. A. Gatchell, G. Macdonald, J. E. S. Sheppard-Jones, A. S. Burgess, R. P. Smith, W. M. McLaren, A. D. Morris, C. K. Carroll, C. B. Tudehope, A. Sandison, D. P. Thomas, A. G. Alexander, W. G. Harnett, A. J. Chillingworth, H. M. Harrison, R. A. Quinn, J. I. Enright, J. G. T. Thomas, B. S. Simmonds, D. S. Graham, A. A. E. Newth, J. R. Wylie, H. W. Harding, G. C. B. Hawes, C. W. Morrison, J. S. Annandale, A. Morgan, J. T. H. Madill, N. J. Judah, J. B. Yelf, J. F. MacKenzie, J. E. Manlove, C. O'Malley, C. Townshend, J. B. Galligan, D. T. Evans, J. G. Lee, P. A. McCallum, W. Scott, S. Nuttall, J. Cathcart, W. G. Thomas, E. B. Morley, G. L. Lawlor, J. B. Fairclough, P. C. Conran, R. E. McLaren, S. R. Prall, E. C. Lindsey, W. Thomas, E. J. Dermott, D. C. Suttie.

To be temporary Captains: W. A. Brown, J. A. Glover (late temp. Capt.), F. W. Jackson, A. T. Wysard (Staff-Surg., R.N., retired), M. McK. McRae.

H. Maclean to be temporary Honorary Captain.

Temp. Lieut. C. J. B. Pasley, from General List, to be temporary Lieutenant.

To be temporary Lieutenants: R. McCaffrey, A. B. Jones, A. R. Leggate, B. P. Hynes, A. L. Candler, F. J. Lawson, L. J. Spence, J. Acomb, T. Howell, F. W. Hartley, S. Upton, R. J. Dick, W. H. Bennett, W. H. Orton, P. J. Montgomery, W. L. Tindle, T. A. Jones, A. V. Boyall, G. B. Messenger, G. T. Bogle, J. S. Clark, F. W. Chesnaye, S. Blake, T. Crawford, L. C. Rivett, A. Densham, F. J. Waldmeier, J. M. Shaw, R. Young, A. W. Laing.

W. R. Rowlands to be temporary Honorary Lieutenant whilst employed with the British Red Cross Hospital, Netley.

Officers relinquishing their commissions: Temp. Capts. J. W. Hutton, S. A. Montgomery, A. C. Turner, R. A. Hughes, G. J. W. Kelgwin. Temp. Lieuts. W. Butement, E. G. Barker, D. H. Foley, E. Reavley, F. D. Crew, G. W. Young, H. Hannigan, H. T. Finlayson, C. H. F. Bailey, R. N. Hartley, W. J. Porteous, A. J. D. Rowan, T. R. Davey, E. K. Williams, and J. Watt, and W. Leslie (on account of ill-health).

SPECIAL RESERVE OF OFFICERS.

Lieutenants to be Captains: H. Chadwick, T. O'Mahony, G. G. Drummond.

W. F. Mason, from Leeds Univ. Cont., O.T.C., to be Lieutenant.

Lieutenant on probation D. Stewart is confirmed in his rank.

TERRITORIAL FORCE.

Capt. (temp. Major) W. D. Watson to be acting Lieutenant-Colonel whilst commanding a Field Ambulance.

Lieuts. A. H. T. Andrew and C. Jephcott to be Captains.

Capt. (temp. Major) C. Corfield relinquishes his temporary rank on alteration in posting.

Lieut. P. W. G. Sargent is seconded whilst holding a temporary commission in the R.A.M.C.

URBAN VITAL STATISTICS.

(Week ended March 24th, 1917.)

English and Welsh Towns.—In the 96 English and Welsh towns, with an aggregate civil population estimated at nearly 18,000,000 persons, the annual rate of mortality was 16·6, against 17·1 and 18·5 per 1000 in the two preceding weeks. In London, with a population exceeding 4,000,000 persons, the death-rate was 17·5, or 1·8 per 1000 below that recorded in the previous week; among the remaining towns the rates ranged from 7·6 in Gloucester, 8·7 in Coventry, and 9·0 in Ilford, to 22·7 in Walsall and in Middlesbrough, 23·2 in Eastbourne, and 23·3 in Gateshead. The principal epidemic diseases caused 381 deaths, which corresponded to an annual rate of 1·1 per 1000, and included 228 from measles, 52 from infantile diarrhœa, 47 from diphtheria, 42 from whooping-cough, 7 from scarlet fever, and 5 from enteric fever. The deaths from measles showed a further increase compared with the numbers recorded in the eight preceding weeks, and caused the highest annual death-rates of 2·2 in Plymouth and in Warrington, 2·4 in Wigan, and 3·4 in Walsall. The 817 cases of scarlet fever and the 1477 cases of diphtheria under treatment in the Metropolitan Asylums Hospitals and the London Fever Hospital were respectively 12 and 1 above the numbers at the end of the previous week. Of the 5496 deaths from all causes in the 96 towns, 166 resulted from violence. The causes of 51 of the total deaths were uncertified, of which 12 were registered in Birmingham, 4 in Manchester, and 3 each in London, Stoke-on-Trent, Liverpool, and Gateshead.

Scotch Towns.—In the 16 largest Scotch towns, with an aggregate population estimated at nearly 2,500,000 persons, the annual death rate was equal to 16·2, against 16·7 and 18·3 per 1000 in the two preceding weeks. The 348 deaths in Glasgow corresponded to an annual rate

of 16·3 per 1000, and included 23 from whooping-cough, 13 from measles, 6 from infantile diarrhœa, and 1 from diphtheria. The 117 deaths in Edinburgh were equal to a rate of 18·4 per 1000, and included 7 each from measles and whooping-cough, and 1 from infantile diarrhœa.

Irish Towns.—The 201 deaths registered in Dublin were equal to an annual rate of 26·3, or 2·3 per 1000 above that in the previous week, and included 17 from measles, 4 from whooping-cough, and 1 from enteric fever. The 156 deaths in Belfast corresponded to an annual rate of 20·7 per 1000, and included 4 from measles and 3 from infantile diarrhœa.

VITAL STATISTICS OF LONDON DURING FEBRUARY, 1917.

In the accompanying table will be found summarised complete statistics relating to sickness and mortality in the City of London and in each of the metropolitan boroughs. With regard to the notified cases of infectious diseases, it appears that the number of persons reported to be suffering from one or other of the ten diseases specified in the table was equal to an annual rate of 4·2 per 1000 of the population, estimated at 4,310,030 persons in the middle of the year; in the three preceding months the rates were 5·0, 3·9, and 4·0 per 1000 respectively. The lowest rates last month were recorded in Kensington, Chelsea, St. Marylebone, Battersea, and Wandsworth; and the highest rates in Paddington, Holborn, the City of London, Shoreditch, and Southwark. The prevalence of scarlet fever showed a slight increase over that recorded in the two preceding months; this disease was proportionally most prevalent in Paddington, Hammersmith, Islington, the City of London, Shoreditch, Bethnal Green, Battersea, and Lewisham. The Metropolitan Asylums Hospitals contained 811 scarlet fever patients at the end of the month, against 1066, 913, and 800 at the end of the three preceding months; the weekly admissions averaged 111 last month, against 95 in each of the two preceding months. The prevalence of diphtheria showed no variation from that recorded in the preceding month; among the various metropolitan boroughs this disease was proportionally most prevalent last month in Holborn, the City of London, Stepney, Southwark, Bermondsey, Deptford, and Greenwich. The number of diphtheria patients under treatment in the Metropolitan Asylums Hospitals, which had been 1543, 1479, and 1420 at the end of the three preceding months, had risen again to 1453 at the end of last month; the weekly admissions averaged 165, against 187, 143, and 168 in the three preceding months. Enteric fever was rather more prevalent than it had been in other recent months; the 35 cases notified during February included 4 in the City of Westminster, 4 in Camberwell, 3 in Paddington, 3 in Kensington, 3 in Stepney, 2 in Fulham, 2 in Bermondsey, and 2 in Wandsworth. There were 29 enteric fever patients under treatment in the Metropolitan Asylums Hospitals at the end of last month, against 37 and 35 at the end of the two preceding months; the weekly admissions averaged 4, against 5 and 6 in the two preceding months. Erysipelas was proportionally most prevalent in Paddington, Kensington, St. Pancras, Poplar, Southwark, and Woolwich. The 16 cases of puerperal fever notified during the month included 2 in Hackney, 2 in Southwark, 2 in Battersea, and 2 in Woolwich. The 61 cases of cerebro-spinal meningitis included 6 in Islington, 5 in Bethnal Green, 5 in Lambeth, 4 in Southwark, and 4 in Camberwell; while of the 8 cases notified as poliomyelitis 2 belonged to Islington and 2 to Lambeth.

The mortality statistics relate to the deaths of persons actually belonging to the several metropolitan boroughs, the deaths occurring in institutions having been distributed among the several boroughs in which the deceased persons had previously resided. During the four weeks ending March 3rd the deaths of 7039 London residents were registered, equal to an annual rate of 21·3 per 1000; in the three preceding months the rates were 14·5, 22·6, and 18·4 per 1000 respectively. The death-rates during the month ranged from 16·1 in Hampstead, 16·6 in Lewisham, 16·8 in Woolwich, 18·2 in Hackney and in Wandsworth, and 18·9 in Hammersmith, to 23·5 in Kensington, 24·7 in Finsbury, 25·4 in St. Marylebone, 25·6 in Bermondsey, 26·0 in Southwark, and 26·5 in Shoreditch. The 7039 deaths from all causes included 386 which were referred to the principal infectious diseases; of these, 204 resulted from measles, 9 from scarlet fever, 55 from diphtheria, 42 from whooping-cough, 5 from enteric fever, and 71 from diarrhœa and enteritis among children under 2 years of age. No death from any of these diseases was recorded last month in Hampstead or in the City of London; they caused the lowest death-rates in Kensington, Stoke Newington, Finsbury, Lewisham, and Woolwich; and the highest rates in Fulham, St. Marylebone, St. Pancras, Southwark, Bermondsey, Lambeth, and Camberwell. The 204 deaths from measles were 57 above the corrected average number in the corresponding period of the five preceding years; this disease was proportionally most fatal last month in Fulham, St. Marylebone, St. Pancras, Southwark, Bermondsey, and Camberwell. The 9 fatal cases of scarlet fever were only half the average number, and included 2 in Deptford and 1 each in Fulham, Hackney, Shoreditch, Poplar, Southwark, Lambeth, and Wandsworth. The 55 deaths from diphtheria were 4 in excess of the corrected average number; this disease was proportionally most fatal in Hammersmith, Islington, Stepney, Southwark, and Deptford. The 42 deaths from whooping-cough were 72 fewer than the average; the highest death-rates from this disease last month were recorded in Paddington, Islington, Southwark, Lambeth, Battersea, and Wandsworth. The 5 fatal cases of enteric fever showed a decline of 6 from the average number, and included 2 in Stepney and 1 each in the City of Westminster, Hackney, and Battersea. The 71 deaths from diarrhœa and enteritis among children under 2 years of age were slightly fewer than the average; the mortality from this cause was proportionally greatest in Paddington, Chelsea, the City of Westminster, St. Pancras, Islington, Hackney, Shoreditch, and Bermondsey. In conclusion, it may be stated that the aggregate mortality in London during the month from these principal infectious diseases was 7·5 per cent. above the average.

ANALYSIS OF SICKNESS AND MORTALITY STATISTICS IN LONDON DURING FEBRUARY, 1917.

(*Specially compiled for* THE LANCET.)

CITIES AND BOROUGHS.	Estimated civil population, 1915.	Notified Cases of Infectious Disease.											Deaths from Principal Infectious Diseases.									
		Small-pox.	Scarlet fever.	Diphtheria.*	Typhus fever.	Enteric fever.	Other continued fevers.	Puerperal fever.	Erysipelas.	Cerebro-spinal meningitis.	Poliomyelitis.	Total.	Annual rate per 1000 persons living.	Small-pox.	Measles.	Scarlet fever.	Diphtheria.*	Whooping-cough.	Enteric fever.	Diarrhœa and enteritis (under 2 years)	Total.	Annual rate per 1000 persons living.	Deaths from all causes.	Death-rate per 1000 living.
LONDON	4,310,030	—	440	613	—	35	1	16	202	61	8	1376	4·2	—	204	9	55	42	5	71	386	1·2	7039	21·3
West Districts:																								
Paddington	131,397	—	18	17	—	3	—	—	13	1	—	52	5·2	—	1	—	—	4	—	4	9	0·9	222	22·0
Kensington	155,796	—	9	13	—	3	—	—	11	2	—	38	3·2	—	4	—	—	—	—	1	5	0·4	281	23·5
Hammersmith	118,559	—	17	11	—	—	—	—	4	2	—	34	3·7	—	1	—	3	1	—	2	7	0·8	172	18·9
Fulham	151,161	—	9	24	—	2	—	1	3	3	—	42	3·6	—	15	1	2	2	—	2	22	1·9	251	21·6
Chelsea	58,421	—	1	4	—	—	—	—	2	—	—	7	1·6	—	—	—	—	1	—	2	3	0·7	94	21·0
City of Westminster	135,104	—	17	12	—	4	—	—	5	2	1	41	4·0	—	4	—	2	—	1	3	10	1·0	234	22·6
North Districts:																								
St. Marylebone	100,260	—	3	7	—	—	—	—	2	1	—	13	1·7	—	15	—	—	1	—	1	17	2·2	195	25·4
Hampstead	81,760	—	9	7	—	1	—	—	4	1	—	22	3·5	—	—	—	—	—	—	—	—	—	101	16·1
St. Pancras	209,322	—	12	29	—	1	—	1	14	3	—	60	3·9	—	19	—	2	1	—	11	33	2·1	350	22·3
Islington	316,242	—	44	49	—	—	—	1	16	6	2	118	4·9	—	6	—	7	6	—	7	26	1·1	542	22·5
Stoke Newington	50,527	—	5	6	—	1	—	—	—	1	1	14	3·6	—	—	—	—	1	—	1	2	0·5	79	20·4
Hackney	217,883	—	21	26	—	1	1	2	3	—	1	55	3·3	—	1	1	2	1	1	7	13	0·8	304	18·2
Central Districts:																								
Holborn	40,405	—	3	12	—	—	—	—	1	1	—	17	5·5	—	2	—	—	—	—	—	2	0·6	68	21·9
Finsbury	76,915	—	8	9	—	1	—	—	5	1	—	24	4·1	—	3	—	—	—	—	—	3	0·5	146	24·7
City of London	19,461	—	5	4	—	—	—	—	—	—	—	9	6·0	—	—	—	—	—	—	—	—	—	33	22·1
East Districts:																								
Shoreditch	103,627	—	19	24	—	—	—	—	7	3	—	53	6·7	—	—	1	1	—	—	3	5	0·6	211	26·5
Bethnal Green	120,307	—	17	20	—	1	—	—	6	5	1	50	5·4	—	5	—	1	—	—	1	7	0·8	198	21·5
Stepney	265,731	—	27	53	—	3	—	—	15	3	—	101	5·0	—	8	—	8	2	2	5	25	1·2	405	19·4
Poplar	156,247	—	7	26	—	1	—	1	14	3	—	52	4·3	—	7	1	1	1	—	3	13	1·1	241	23·1
South Districts:																								
Southwark	179,424	—	13	53	—	—	—	2	18	4	—	90	6·5	—	18	1	5	4	—	2	30	2·2	368	26·0
Bermondsey	117,188	—	12	26	—	2	—	1	1	—	—	42	4·7	—	12	—	2	—	—	5	19	2·1	230	25·6
Lambeth	284,188	—	31	44	—	—	—	1	6	5	2	89	4·1	—	20	1	5	5	—	5	36	1·7	496	22·7
Battersea	161,945	—	24	6	—	1	—	2	5	—	—	38	3·1	—	9	—	1	3	1	1	15	1·2	263	21·2
Wandsworth	312,249	—	29	29	—	2	—	—	5	3	—	68	2·8	—	18	1	1	5	—	2	27	1·1	437	18·2
Camberwell	254,385	—	22	32	—	4	—	1	10	4	—	73	3·7	—	26	—	3	3	—	1	33	1·7	435	22·3
Deptford	110,299	—	14	20	—	1	—	—	6	—	—	41	4·8	—	1	2	4	—	—	—	7	0·8	169	20·0
Greenwich	96,385	—	7	22	—	1	—	1	3	3	—	37	5·0	—	5	—	1	—	—	1	7	0·9	148	20·0
Lewisham	164,438	—	22	17	—	1	—	—	9	2	—	51	4·0	—	1	—	3	—	—	1	5	0·4	210	16·6
Woolwich	129,506	—	15	11	—	1	—	2	14	2	—	45	4·5	—	3	—	1	1	—	—	5	0·5	167	16·3
Port of London	—	—	—	—	—	—	—	—	—	—	—	—		—	—	—	—	—	—	—	—	—	—	—

* Including membranous croup.

Correspondence.

"Audi alteram partem."

"SOLDIER'S HEART."

To the Editor of THE LANCET.

SIR,—Captain Adolphe Abrahams's paper on "Soldier's Heart," published in your issue of March 24th, is one which has interested me very greatly. With many of his points of view I am in entire sympathy; in none more so than when he discusses the effect of *strain* upon the heart. The inherent improbability that so vital a muscle as that of the healthy heart is materially exposed to damage during physical effort is so obvious that the strongest evidence of such damage must be forthcoming before the hypothesis of strain can become acceptable. There is no doubt in my mind that in a number of the earlier records of dilatation following effort such dilatation resulted from a paroxysm of tachycardia, great acceleration of the heart's action, and acceleration of pathological type; certainly that has been the cause of dilatation in all the cases of so-called strain with sudden dilatation which I have seen. Such paroxysms are unquestionably provoked by effort, but only, I believe, when there is a pre-existing defect in the heart. Amongst a group of 558 cases of so-called "D.A.H." admitted to the Military Hospital, Hampstead, last year the histories associate the onset of the symptoms with sudden effort in five instances only. There can be little disagreement that effort aggravates the symptoms, and that effort displays defects which are latent, but that it is *responsible* for the condition which Captain Abrahams describes is not to be believed upon the evidence which is before us. Captain Abrahams claims a wide experience of athletes, and his statements in regard to them form a valuable contribution to the subject discussed; he would do all those who are interested in cardiac problems a considerable service if at some future date he would describe his experience at greater length.

When Captain Abrahams states, in discussing the value of murmurs in estimating the soldier's fitness for duty, that the heart's capacity for doing work is the vital criterion our observations at Hampstead bear out his statement completely. In a group of 462 patients at Hampstead 266 were entirely free from cardiac murmurs, while 196 presented systolic murmurs over some valve area. These patients were all classified as to their capacity for duty by testing their tolerance to physical drill and route marches extending over many weeks. Of the 266 presenting no murmurs (the controls) 154, or 58 per cent., were considered on the basis of exercise tests to be permanently unfit for duty, while 42 per cent. were returned to duty. Of the 196 men presenting murmurs 101 (or 52 per cent.) were judged on the same basis to be unfit and 48 per cent. returned to duty. The group of cases has been further subdivided according to the situation of the murmur, its conduction, &c., but the balance remains the same between the fit and the unfit—namely, approximately 50 per cent. each way. In a report about to be issued by the Medical Research Committee I have therefore concluded that "the presence or absence of systolic murmurs is of no value in estimating the soldier's capacity for work."

Lastly I come to a statement of Captain Abrahams which concerns a recent publication by myself and co-workers. He states that "Recently 'soldier's heart' has been attributed to deficiency of buffer-salts in the blood." This statement cannot be allowed to pass without correction. In an article written in conjunction with Cotton, Barcroft, and others, our belief is stated that *breathlessness* may be due to this cause. That is, as I am sure Captain Abrahams will on consideration agree, a different statement from that which he attributes to us. It is true that our conclusion applies to breathlessness as we have seen it in "those who are diagnosed as 'irritable hearts'"; but we nowhere imply that a deficiency of "buffer-salts" is the whole condition, nor do we imply that the same change may not be found in the future in distinct conditions. Neither do we attempt, as may be inferred from Captain Abrahams's article, to ascribe "symptoms of cardiac disease" to a deficiency of these salts. Indeed there is nothing in our article which suggests that we believe any of the symptoms of the condition discussed emanate from cardiac disease. We deal with one symptom only—namely, breathlessness—and in so far as we deal with this we express the view that it is not cardiac in origin.

I am, Sir, yours faithfully,

THOMAS LEWIS.

Military Hospital, Hampstead, March 24th, 1917.

THE MOBILISATION OF THE DENTAL PROFESSION.

To the Editor of THE LANCET.

SIR,—The dental profession cannot fail to appreciate the views expressed in the leading article in THE LANCET of March 10th, and let us hope that our authorities will at last see that the best and least expensive manner to meet the needs of the Army is to organise a proper Army Dental Corps as other nations have done. It is quite correct that there are only 5000 qualified men, but it must not be supposed that if all of them were mobilised there would be nobody left to attend to the needs of the community. The bulk of the dental work in England is done by unqualified men, the exact number of whom is unknown, but is sometimes quoted as high as 40,000. These men may not call themselves dentists or dental surgeons, but they are free to practise, for our law does not protect the qualified man nor prohibit the unqualified from practising. The services of these men could not be used in the treatment of the soldiers, but many of them are skilled mechanics, and they could serve in that capacity.

In view of the great shortage of qualified men available for Army service, the first thing to do is to stop the wasteful use of the practitioners who have been drafted into the combatant ranks. Some of them have already been killed, but the remainder should be withdrawn from the ranks and utilised in their own special work.

I am, Sir, yours faithfully,

France, March 22nd, 1917. F. NEWLAND-PEDLEY.

SPECIFICITY IN ANTISEPTICS.

To the Editor of THE LANCET.

SIR,—There can be no doubt that the question raised by Dr. Kenneth Taylor in your issue of Feb. 24th—namely, that of the specificity of an antiseptic—is an important one, and must be kept in view in dealing with the practical problem of wound treatment. But almost of equal importance is the question of the specificity of the medium for the organism and of the antiseptic for the medium. The specificity of the medium for the organism Dr. Taylor acknowledges, when, for his experiments, he chooses "fluid medium suitable for the organism." If he had employed another medium I feel confident that he would have had very different results.

Regarding the specificity of the antiseptic for the medium, it has been shown that many antiseptics which act well in serum or other media suitable for the growth of organisms become practically inert when they react with pus. For this reason the hypochlorites are practically useless as "dressing solutions" except to ensure asepsis, while as irrigation lotions, when they are in too great bulk to be completely quenched, they appear to be excellent. I would suggest, therefore, that in our experiments on antisepsis we should direct our attention to media as like those in which the organisms thrive in a wound as it is possible to get. Infected pus or blood provides such a medium, for these contain, for practical purposes, all the elements of tissue except the fibrous stroma. If pus is used it should contain one or two organisms per field; if blood is used it should be defibrinated, inoculated with a small volume of a suspension of organisms, and incubated a short time to allow some phagocytosis to take place. Such a blood medium can readily be standardised so as to give comparative results. As in Dr. Taylor's experiment, the inhibiting strength of the antiseptic in such a medium serves well to give an estimate of its potency. It is noteworthy that, as a rule, an antiseptic is more effective if phagocytosis has not been allowed to take place—i.e., when the organisms are in serum.

One other point I would raise. In reference to "physiological treatment" Dr. Taylor, who has already severely

criticised the claims made for hypertonic saline, now describes the application of physiological saline as a method of "passive treatment" and "a purely negative one." He thus shows clearly that he does not agree with the author of physiological treatment who says "that the white corpuscles are carried forward by a chemotactic movement in the direction of the free surface upon which the physiological solution has been imposed." This, and the statements regarding the physical action of hypertonic saline, I have shown to have no sound experimental foundation. If clinically the physiological methods are satisfactory, we are faced by the problem of finding the true explanation.

I am, Sir, yours faithfully,

Warrington, Feb. 28th, 1917. WM. PARRY MORGAN.

THE CLOSURE OF COLOTOMY OPENINGS.

To the Editor of THE LANCET.

SIR,—In connexion with Mr. Lockhart-Mummery's paper in your issue of March 10th, and the subsequent correspondence on this subject, I have looked up the statistics of the cases operated upon in the Royal Infirmary, Sheffield, during the years 1906–1916. The method adopted in all but one has been that described by Professor Sinclair White in your issue of March 24th. The one exception was that in which an enterotome was used to destroy the spur. I was resident surgical officer at the time. The special type of instrument was obtained which Mr. Lockhart-Mummery designates as the best, "in which a male blade fits into a double female blade, the blades being of thin steel with a waved edge." The patient developed peritonitis due to sloughing of the gut, and only after a long and anxious convalescence did he recover. Since then the enterotome has not been used in any case.

The number of cases in the period is 38, with one death. I have seen many of these cases subsequently in the out-patient department, and in no case have they complained of a weak spot in the abdominal wall which might necessitate the wearing of a belt. I only know of one of these cases subsequently developing intestinal obstruction. It was due to the gut becoming involved in secondary carcinoma well above the position of the closed colotomy opening. The operation, if done as described by Greig Smith and quoted by Professor Sinclair White, is not regarded by us as one fraught with severe risk to the patient.

From experience in the after-treatment of these cases during the past ten years as a resident officer and otherwise, I know that every endeavour should be made to keep the bowels from acting as long as the comfort of the patient will permit. Mr. Lockhart-Mummery does not state what the subsequent trouble is likely to be if the bowels do not act on the second day after operation. I respectfully suggest that if they are made to act as a routine on the second day, then the number of failures in closing a colotomy opening will be much increased.

I am, Sir, yours faithfully,

ERNEST FINCH,

March 26th, 1917. Assistant Surgeon, Royal Infirmary, Sheffield.

SIMPLE ULCER OF THE ŒSOPHAGUS.

To the Editor of THE LANCET.

SIR,—I am interested in Dr. J. B. Christopherson's case of simple ulcer of the œsophagus published in your issue of March 10th. During an experience of 12 years as pathologist to large hospitals I have come across two such cases. In one case which I published in 1912,[1] the ulcer was situated immediately above the cardiac orifice of the stomach, and it ruptured into the mediastinal tissues and then into the left pleura, the man dying from pyopneumothorax. The patient had suffered from gastric disturbance for two years previously. Since then I have had another case, also in a man, who had suffered from gastric pain after food for six years. He developed severe hæmatemesis two days before death. At the post-mortem, an ulcer one inch in length was found immediately above the cardiac orifice. In addition, there were several cicatrices in the neighbourhood, as in Dr. Christopherson's case. There was a fine cirrhosis of the liver, but no evidence of varicosity of the œsophageal veins. The vessel opened into was a small one. There were no ulcers in the stomach or duodenum.

I must say that I fail to see the force of Dr. Christopherson's arguments in favour of the condition in his case being due to typhoid fever contracted six years previously. I have never seen typhoid ulceration in such a situation, and it is generally recognised that these œsophageal ulcers probably have a similar origin to the peptic ulcer of the stomach. Glynn[2] has drawn attention to the frequency with which superficial lesions occur in the œsophagus in association with severe vomiting. It may be, therefore, that chronic gastric catarrh associated with vomiting initiates the condition which ultimately leads to ulceration.

I am, Sir, yours faithfully,

Craigleith, March 22nd, 1917. JAMES MILLER, M.D.

[1] Brit. Med. Jour., March 20th, 1912.

THE CRIMINAL LAW AMENDMENT BILL.

To the Editor of THE LANCET.

SIR,—This Bill is at present being discussed by a committee of the Commons, and the consideration of Clause 2 has been postponed. As readers may be aware, this clause proposes a penalty up to 24 months with hard labour if a venereal person has sexual relations—provided he shall not be punished if he or she has "reasonable grounds" for believing that he or she is free from venereal.

In connexion with this proviso, would it not be well if a clause were added that any doctor receiving a written report from a bacteriologist relating to a blood, pus, or tissue test must retain such report, and must not hand it to a patient? Now, if some 6 to 10 millions of venereals get a hold of such reports and show them to persons immediately concerned much evil may be caused; there could be a good market with pros. and semi-pros. of these. Also a penalty should be provided against such sales, transfers, loans, and otherwise. I am, Sir, yours faithfully,

Liverpool, March 18th, 1917. ROBERT R. RENTOUL, M.D.

PS.—Is it too late to hope that all the clauses relating to brothel-keeping, soliciting, indecent assault, rape, &c., be deleted from this Bill, and that it be made a Public Health Act, relating to venereals only?

ECONOMY IN RUBBER GLOVES.

To the Editor of THE LANCET.

SIR,—Some years ago I used myself to repair my car tyres by vulcanisation, and being struck by the waste of punctured and torn rubber gloves at a local hospital I was led to experiment in the repair of these gloves by vulcanisation. In course of time I elaborated a suitable electric vulcaniser, and approached some surgical-instrument firms with the idea of putting it on the market. Technical difficulties intervened, however, and it was found to be more convenient to get a firm of repute to undertake the repairs with the apparatus.

For several years now many hospitals, military and civil, have effected a considerable saving, perhaps as high as 50 per cent., in their glove bill by this means. As a big hospital may spend £100 or more a year on gloves, it is obvious that here to hand is a ready means of effecting economy with no loss of efficiency. The repairs thus effected have the following advantages over patches simply stuck on with rubber solution: 1. The patches are so small as to be almost impalpable. 2. They do not come off, even after repeated sterilisations. 3. A new finger can be put on a glove; for instance, the right forefinger of a glove is often lacerated badly and needs renewal. 4. A long slit can be repaired, or a new wrist affixed, or two lacerated gloves made up into one good one.

The repairs are undertaken by Messrs. W. and A. Bates, Rubber Mills, Leicester.—I am, Sir, yours faithfully,

N. I. SPRIGGS, M.D. Lond., F.R.C.S. Eng.,

Leicester, March 26th, 1917. Captain, R.A.M.C. (T.).

[2] Proceedings of the Pathological Society of Great Britain and Ireland, 1914.

THE Wounded Allies Relief Committee, 8, Grosvenor-gardens, S.W., has presented to the Serbian Relief Fund the sum of £500, to be spent exclusively on providing food for sick and wounded Serbian prisoners of war in Germany.

The War.

THE CASUALTY LIST.

THE following names of medical officers appear among the casualties announced since our last issue :—

Killed.

Capt. W. B. Clark, R.A.M.C., attached Scots Guards, was a student at King's College Hospital, and qualified in 1903 at London University. He joined the R.A.M.C. in October, 1914, and was killed by the bursting of a shell whilst doing duty with the Scot Guards.

Capt. E. Robinson, R.A.M.C.

Wounded.

Capt. A. F. Wilson, R.A.M.C., attached York and Lancaster Regiment.

Capt. W. B. Purchase, R.A.M.C., attached Royal Field Artillery.

Capt. F. G. Thatcher, R.A.M.C.

Capt. P. S. Blaker, R.A.M.C.

Capt. E. H. Moore, D.S.O., R.A.M.C.

THE HONOURS LIST.

The following awards to medical officers are announced :—

Distinguished Service Order.

Temp. Surg. Harold Boultbee Padwick, R.N.

For conspicuous gallantry and devotion to duty. He remained in the open, and continued to tend the wounded under very heavy fire. Later, he proceeded to Headquarters, and at great personal risk brought in many wounded men. He displayed great courage and determination throughout the operations.

Bar to Military Cross.

Temp. Capt. Archibald Stirling Kennedy Anderson, M.C., R.A.M.C., attached R.N. Field Ambulance.

For conspicuous gallantry and devotion to duty. He rendered most valuable services while in command of a bearer subdivision, in assisting to collect wounded from a forward area under very heavy fire. (The award of the Military Cross was announced in THE LANCET of Sept. 2nd, 1916, p. 450.)

Military Cross.

Temp. Lieut. Herbert John Davidson, R.A.M.C., attached R.N. Field Ambulance.

For conspicuous gallantry and devotion to duty. He tended the wounded in a forward area under very heavy fire. He set a splendid example to all ranks.

Capt. Robert Andrew Kerr, R.A.M.C., attached Royal Warwickshire Regiment.

For conspicuous gallantry and devotion to duty. He succeeded in rescuing his three bearers, who were entombed when the aid-post was blown in. He constantly visited the most dangerous parts of the line in order to tend the wounded.

Temp. Lieut. Allan George Reid, R.A.M.C., attached R.N. Field Ambulance.

For conspicuous gallantry and devotion to duty. He tended the wounded under very heavy fire, and worked continuously for 36 hours in command of a bearer subdivision which was operating in a forward area.

Capt. Norman Craig Shierlaw, Australian A.M.C., R.M.O., Australian Infantry.

For conspicuous gallantry and devotion to duty. He continually attended to the wounded for two days and nights under heavy fire. He has on many previous occasions done fine work.

Foreign Decoration.—The President of the French Republic has conferred the Croix de Guerre avec Palme upon Surgeon J. D. Milligan, R.N.

The name of Surgeon J. D. Milligan is also mentioned in a despatch dealing with naval matters.

DEATHS AMONG THE SONS OF MEDICAL MEN.

The following sons of medical men must be added to our lists of those who have fallen during the war :—

Second Lieut. J. H. Cotterill, Black Watch, youngest son of Lieut.-Col. J. M. Cotterill, R.A.M.C., of Edinburgh.

Second Lieut. R. M. Ross, Worcestershire Regiment, youngest son of Dr. D. M. Ross, of Brighton.

Capt. W. B. Clark, R.A.M.C., younger son of Dr. G. B. Clark, formerly M.P. for Caithness.

Capt. E. P. Turner, Royal Field Artillery, younger son of Surgeon-General G. R. Turner, of Radlett, Herts.

HOSPITAL SHIP TORPEDOED.

The British hospital ship *Asturias* was torpedoed without warning on the night March 20th–21st. She had previously landed about 900 sick cases. The casualties amongst the medical services included 11 dead, 3 missing (including 1 female staff nurse), and 17 injured. Between 300 and 400 survivors were landed; some were injured by the explosion and 3 died after being landed.

WAR HOSPITAL WORK IN HAMPSHIRE.—A meeting under the auspices of the British Red Cross Society was held at Winchester on March 21st. The county director, Mr. Lockhart Stephens, reported that there were in Hampshire 53 auxiliary hospitals, 9 of which were under the control of the Order of St. John, 33 under the Red Cross Society, and the remainder promoted and largely maintained by private individuals. The accommodation was about 2000 beds, and in response to the official appeal for expansion it was hoped that an additional 1344 beds would be provided within a few weeks. The number of Red Cross detachments in the county was between 60 and 70, with a membership of 1869, of whom 1049 were on actual V.A.D. service, and 186 were working in military or naval hospitals. Upwards of 400 members had enrolled under the general service scheme. No less than 45 women had almost completed their training as stretcher-bearers, when they would release men at Netley Hospital for other work. About 150 men, unfit for military service, were relieving the disembarkation staff at Southampton.

THE TRAINING OF THE DISABLED SOLDIER.—The statement of Mr. Barnes in the House of Commons recently, on which we commented in our issue of March 17th, adds interest to an account of the training in the Queen Mary's workshops at the Pavilion Military Hospital, Brighton, which appears in the organ of that hospital, *The Pavilion "Blues,"* for March. After an experience of six months Mr. A. G. Baker, the superintendent of trades instruction, speaking of the maimed sailor and soldier, is convinced that many of these men may by suitable training be enabled to take their place as self-dependent citizens, if only they will give up a little of their spare time. The workshops are run on entirely voluntary lines, no other inducement being offered to attract the men than self interest. Strict discipline is enforced, and each student is expected to attend as regularly as medical treatment will permit, yet the conduct of the students has left nothing to be desired, while many of those who have obtained remunerative work have expressed their gratitude for the training received. This at present comprises commercial training, woodwork, elementary electricity, and motor engineering. Her Majesty the Queen has signified her intention of bearing the cost of a new building to which it is proposed to transfer the commercial training classes, and in their place it is proposed to instal leather trades and possibly tailoring. The field of selection has been widened by the coöperation of the headmaster of the School of Art, Brighton, and the principal of the Technical School. The workshops, which are registered under the new Act, rely upon voluntary contributions for their main support.

MILITARY HOSPITAL MAGAZINES.—The *Bulletin*, the official organ of the Third Western General Hospital (Cardiff, price 3*d*.) makes its first appearance, and as its contemporaries have done, prints accounts of the social activities of the hospital whence it emanates, with portraits of the staff and articles and illustrations, humorous and otherwise, of a topical nature. It is well printed and we wish it success, for the sales of these journals benefit those to whom the hospitals minister. The current issue of the *Ration*, the magazine of the Reading War Hospitals (Reading, price 2*d*.), maintains a good reputation, especially on the illustrative side, while the March issue of the *Craigleith Hospital Chronicle*, the organ of the Second Scottish General Hospital (Edinburgh, price 6*d*.), has among its contents a readable account of the Scottish Soldier of Fortune and the continuation of the story of the Gordon Highlanders.

Obituary.

JOHN MORTIMER, M.B. LOND., M.R.C.S. ENG.,
CONSULTING SURGEON, EXETER DISPENSARY.

Mr. J. Mortimer, who died at his residence in Exeter on March 9th, was the fourth son of the late Mr. W. Mortimer, J.P., of Exeter. He received his medical education at University College Hospital, London, taking his M R C.S in 1876, and in 1877 graduated M.B. of London University. Mr. Mortimer practised in Exeter for many years, where he was highly respected. He was consulting surgeon to the Exeter Dispensary and on the honorary consulting staff of the Devon and Exeter Dental Hospital. He was also examining medical officer to the Devon Constabulary. At the commencement of the war he was attached to the Southern General Hospital, with the rank of Major, R.A.M.C. (T.F.), but ill-health compelled him to resign the appointment last year.

ARTHUR EDWARD PERMEWAN, M.D. LOND., M.R.C.S., L.S.A., D.P.H CANTAB., J.P.

Dr. A. E. Permewan died at his residence in Redruth, Cornwall, on March 21st, after a short illness. The deceased was a son of the late Dr. J. Permewan, of Redruth, and received his medical education at University College Hospital, graduating as M.D. London in 1883. He succeeded to his father's practice about 20 years ago and held numerous appointments, being surgeon to the Redruth Miners' Hospital, medical officer for the Redruth district, and medical officer of health for the Redruth rural district. For several years he was a member of the Redruth urban council and was a former chairman of that body. He was a member of the Cornwall Insurance Committee and a magistrate of the county of Cornwall. Dr. Permewan was held in much respect in Redruth and the district, and much sympathy is felt locally for his family.

Medical News.

UNIVERSITY OF DURHAM, FACULTY OF MEDICINE.—At the Second Examination for the degree of Bachelor of Medicine held recently the following candidates were successful:—

Anatomy and Physiology.—Elgar Frederick Herbert Bell, Robson Christie Brown (second-class honours), Nan Coxon, Samuel Whately Davidson, Mark Julius Eriberg, Alfred Stoddart Graham, Hamid Kamel, Malik Abdur Rahman Mansoor, Thomas Norman Vickers Potts, and May Raw.

UNIVERSITY OF MANCHESTER.—At the examination for the Diploma in Public Health held recently the following candidates were successful:—

T. C. Mackenzie and S. N. Mitra.

UNIVERSITY OF LIVERPOOL.—At the examination for the degrees of Bachelor of Medicine and Bachelor of Surgery, held recently, the following candidates were successful:—

Mikhail Azer, Constance Maude Edwards, Shaikh Mohomed Afzal Faruqi, Austin Jewkes Barlow Griffin, Isaac Jacob Lipkin (second-class honours), Robert Nixon, Charles Victor Pearson, Paull Bazar Pinkerton (second-class honours), Eric Strawson Stubbs (first-class honours), and Rattan Chaud Watts.

QUEEN'S UNIVERSITY OF BELFAST.—At examinations held recently the following candidates were successful:—

M.CH. EXAMINATION.

John W. West.

M.B., B.CH., AND B.A.O. EXAMINATION.

Joseph Adams, William L. Agnew (second-class honours), Samuel T. Alexander, Patrick Clarke, John H. Davison, William Harvey (second-class honours), James H. B. Hogg, Louis Jefferson, Robert N. B. McCord (first-class honours), William C. McCullough, Patrick J. McSorley, John Scott (second-class honours), and John Wilson (second-class honours).

THIRD MEDICAL EXAMINATION.

Pathology and Materia Medica.—John Barron, David Cromie, Thomas Dickey, Charles W. A. Emery, Stewart Fullerton, John Grimson, Robin Hall, Samuel Hall, John M. Hosey, Joseph G. M. Leyden, William Napier, Jeremiah O'Kane, John E. Rea, and Andrew Watson.

Materia Medica.—Samuel Acheson, Thomas G. Campbell, Alfred E. Gallaher, Arthur H. Henry, George D. F. McFadden, William Michael, Hugh Paul, Henry Poston, Louis P. St. J. Story, Percival S. Walker, and Thomas Wallace.

Pathology.—Ruth M. Slade.

Medical Jurisprudence and Hygiene.—Crawford Blair, Thomas J. A. Connolly, David Cromie, Thomas Dickey, Daniel J. McGurk, Robert Nimmons, Charlotte Pedlow, and Andrew Watson.

Hygiene.—Samuel Acheson, Thomas G. Campbell, Alfred E. Gallaher, Arthur H. Henry, George D. F. McFadden, William Michael, Hugh Paul, Henry Poston, Louis P. St. J. Story, and Percival S. Walker.

SECOND MEDICAL EXAMINATION.

Anatomy and Physiology.—Winifred W. Boland, Reginald N. Deane, Robert Duncan, David W. J. Gray, James S. F. J. Kerr, and Leonard G. Morrison.

Anatomy.—Helen M. Murnane.

D.P.H. EXAMINATION.

Mary G. Caskey and David L. McCullough.

UNIVERSITY OF ABERDEEN.—At the graduation ceremony on March 23rd the following degrees were conferred:—

Doctor of Medicine (M.D.).—James Clark Bell (honours for thesis) and George Riddoch (honours for thesis).

Bachelor of Medicine (M.B.) and Bachelor of Surgery (Ch.B.).—Wm. Francis Whitaker Betenson, James Sutherland Balkwill Forbes, *Richard Ramsay Garden, *Archibald Clive Irvine, *Alex. Gow Lumsden (second-class honours), Wm. Calthorpe MacKinnon, *George Reid McRobert (second class honours), †Charles Gordon Shaw Milne, Maggie Jane Moir, M.A., James Macdonald Morrison, Wm. Wyness Nicol, Frank Miller Rorie, Charles Shearer, Arthur Percy Spark, †Robert Thom, Thomas David Watt, Jean Ordgarff Yule, and Vincent Thomas Borthwick Yule.

* Passed Fourth Professional Examination with much distinction.
† Passed Fourth Professional Examination with distinction.

THE RÖNTGEN SOCIETY.—The general meeting of this society, to be held at the Cancer Hospital on April 3rd, at 8.15 P.M., will be followed by a discussion on the Future of the British X Ray Industry, opened by Mr. Geoffrey Pearce, in which Sir J. Mackenzie Davidson, Professor A. W. Porter, F.R.S., Major Wilson, C.A.M.C., Dr. C. R. C. Lyster, and others will take part.

DOCTORS OF MILITARY AGE: THE SQUABBLE AT OMAGH.—A correspondent writes: "The never-ending squabble about doctors of military age continues at Omagh, co. Tyrone. The latest phase has arisen from the fact that the Local Government Board refused to sanction payment, on the ground that he was of military age, to the doctor who has been doing duty for Dr. D. F. Murnaghan during the latter's illness. On March 24th, at a meeting of the Omagh guardians, it was, however, decided by 27 votes to 23 to pay the locum-tenent's account, £31 10s., and it remains to be seen what will be the final action of the Local Government Board on this disputed matter."

THE HEALTH OF THE UNITED STATES ARMY.—The report of the Surgeon-General of the United States Army for 1916 dealing with the calendar year 1915 shows that the general health of the troops during that period was excellent, a matter which to-day assumes an importance quite outside its sanitary bearing. The number of men composing the army was approximately 100,000, distributed in varying numbers over a wide geographical area—namely, from the 66th meridian W. longitude to the 115th meridian east of Greenwich, and from the 64th degree N. latitude to within seven degrees of the equator, thus giving the medical officers in their capacity of sanitary advisers to the line an opportunity of studying the recent advances of modern preventive medicine under the most varied conditions. The non-effective rate for the entire army from disease alone was 20·85 per 1000, while from all causes it was 25·22, or a rate slightly higher than that for 1914, though still much below the rate for any preceding year except 1913, when it was 23·98. The death-rate of the entire army from all causes was 4·45, that from disease being 2·53. The discharge-rate from all causes was 14·06. Malarial fevers showed the lowest non-effective rate in the history of the army—namely, 0·54—the record in the Philippines being specially creditable as compared with former years. There were 8 cases of typhoid fever in the entire army with no deaths, all making good recoveries. Tuberculosis showed an admission rate of 3·49. In regard to venereal diseases, which in all countries are a very serious factor against military efficiency, it is pointed out that the measures adopted by the United States Army to limit its ravages include regular medical examination twice a month, prompt isolation, quarantine and hospital treatment, other measures being court-martial and stoppage of pay. Opportunities for study and sport, together with good food and clothing, have their influence, while earnest appeals are made on moral and ethical grounds. The admission rate for these diseases was 83·60 as compared with 89·84 in the previous year. The non-effective rate was considerably higher in 1915 than in 1914. Alcohol, which was banished from the garrisons, camps, and the navy before the war, says the Surgeon-General, must hereafter be held unqualifiedly antagonistic to military efficiency. The admission and non-effective rates for alcoholism have shown a steady decline, keeping pace with general public sentiment and the decreased use of stimulants in all walks of life in the United States.

Parliamentary Intelligence.

NOTES ON CURRENT TOPICS.

Criminal Law Amendment Bill.

THE Standing Committee of the House of Commons, to which the Criminal Law Amendment Bill has been referred, further considered it on Thursday, March 22nd.

Clause 7 extends the Indecent Advertisements Act, 1889. One of the provisions in the clause substitutes the following section for Section 5 of the principal Act:—

Any advertisement relating to syphilis, gonorrhœa, nervous debility, or other complaint or infirmity arising from or relating to sexual intercourse, and any advertisement which suggests, directly or indirectly, the use or taking of any appliance, drug, substance or thing, for the purpose of procuring miscarriage or abortion, or which suggests, directly or indirectly, that any premises are or can be used for immoral purposes, shall be deemed to be printed or written matter of an indecent nature within the meaning of Section 3 of this Act.

In the course of the discussion of this provision objection was taken to the wording on the ground that nervous debility in some cases arose from overwork and other causes with which the Bill was not intended to deal. A slight alteration was accordingly made in the text with the intention of making it clear that the complaints and infirmities enumerated were only those "arising from or relating to sexual intercourse." A proposal was made to include amongst the penalised advertisements those which suggested the use of any appliance, drug, substance, or thing for the purpose of preventing conception. On it being pointed out that such a provision might overload the Bill and give rise to some opposition it was withdrawn.

The consideration of Clause 7 was resumed on Tuesday, March 27th.

An amendment was introduced making it punishable to issue an advertisement "which offered to give advice" relating to miscarriage or abortion.

Mr. GLYN-JONES moved as an amendment the insertion of the following subsection:—

Any person who holds out or recommends to the public by any public notice or advertisement, or by any written or printed papers or handbills, or by any label or words written or printed affixed to or delivered with any packet, box, bottle, phial, or other inclosure containing the same, any pills, powders, lozenges, tinctures, potions, cordials, electuaries, plaisters, unguents, salves, ointments, drops, lotions, oils, spirits, medicated herbs and waters, chemical and officinal preparations whatsoever to be used or applied externally or internally as medicines or medicaments for the prevention, cure, or relief of any venereal disease, shall be guilty of an offence under Section 3 of The Indecent Advertisements Act, 1889. Provided that regulations may be made providing for the publishing or notification of the therapeutic properties and uses in connexion with the treatment of venereal diseases of any drug, medicine, or appliance in such manner and to such persons as the Local Government Board may direct.

The honourable Member said that it was the view of pharmaceutical chemists that the subject would not be sufficiently covered without this provision. At first Sir GEORGE CAVE was disinclined to accept the amendment, because he thought it would go too far. After some discussion he agreed to consider the matter before the Report Stage, and to take advice on it. In withdrawing the amendment, so far as the present stage was concerned, Mr. GLYN-JONES observed that if restrictions were to be put on advertisements of this kind, these restrictions must, in the interests of the honest trader, be made watertight.

Clause 7 went on to provide that—

Nothing in the Indecent Advertisements Act, 1889, as amended by this Act, shall apply to any advertisement by any local or public authority, or to any advertisement published in any bonâ fide medical or pharmaceutical publication or pharmaceutical trade list; and a person charged under that Act as so amended with publishing an advertisement, if he is not himself the advertiser, shall not be convicted if he proves that he did not know, and had no reasonable ground for suspecting, that the advertisement was of such a character as to make the publication thereof an offence.

Mr. GLYN-JONES moved as an amendment to strike out the greater part of this provision and to substitute words so that it should read:—

Nothing in the Indecent Advertisements Act, 1889, as amended by this Act, shall apply to any advertisement by any local or public authority, or to any advertisement the publication of which has been authorised in writing by the President of the Local Government Board or by one of His Majesty's Secretaries of State.

He said that he doubted whether anyone could give a good definition of what was a *bona-fide* medical or pharmaceutical publication. He feared that if a person was infected with one of the complaints with which the Bill dealt he might turn to medical journals, where remedial preparations were advertised.

Mr. KING and several other Members expressed the opinion that in the matter of making known research work the provisions of the clause might operate in giving a monopoly to the medical profession.

Sir GEORGE CAVE said that the whole purpose of these provisions was to prevent public advertisements of information dealing with this subject being addressed to ignorant people. It was not desired to prevent *bona-fide* inventors bringing remedies to the notice of qualified men.

Mr. DILLON: How do you propose to prevent the ignorant public having recourse to medical journals?

Sir GEORGE CAVE: I agree there is that risk, but I do not think the man in the street does buy THE LANCET or will buy it for this purpose. The danger was from advertisements in daily and weekly papers of quack remedies, which the sufferer used instead of going to consult a medical man. It would be a novel and undesirable plan to entrust the censoring of these advertisements to a Government department. He would, however, see his advisers as to whether there should be some provision against abuse in medical and pharmaceutical publications.

Mr. H. SAMUEL suggested that circularising should be substituted for advertisements.

Sir GEORGE CAVE promised to give careful consideration to the suggestions which had been brought forward.

The amendment was withdrawn and the clause as amended was agreed to.

Military Service (Review of Exceptions) Bill.

Mr. MACPHERSON, the Under Secretary for War, has introduced in the House of Commons a Bill "to enable the exception from Military Service of men excepted on the ground of previous rejection, or the previous relinquishment of, or discharge from, Naval or Military Service, or unsuitability for Foreign Service, to be reviewed." It has been read a first time.

HOUSE OF COMMONS.

WEDNESDAY, MARCH 21ST.

Commissioned Dental Surgeons.

Mr. MACPHERSON (Under Secretary for War) informed Sir Charles Seely that the number of commissioned dental surgeons in the Army was 454.

Classification of Men in the Army.

Speaking in Committee of Supply on Army Estimates, Mr. MACPHERSON said: I pointed out on a previous occasion that the accuracy of the examinations of the Royal Army Medical Corps and the various medical corps was an astonishing fact. It is the intention of the War Office—whether it will be carried into effect or not—to alter the classification of men. At present we have Class A, Class B, and Class C, and the various sub-classes in each of those categories. I understand that the proposal is now in favour at the War Office to alter the categories to two distinct ones—Class A and Class B. Class A will be very likely the class fit for general service and Class B those not fit for general service. At the present time I confess we have sent men of Class C 1 and C 2, who are supposed to be men to be utilised for labour at home, to France, but I understand that in each individual case a medical re-examination has taken place, and I understand that the medical authorities have given it as their opinion that the climatic conditions are in no way better and in no way worse here than in Northern France. I do not understand that, so far, any man in Class C 1 or Class C 2 has been sent to any theatre of war except Northern France.

THURSDAY, MARCH 22ND.

Poisoning Wells on Western Front.

Replying to Mr. BROOKES, who asked whether the War Office was in possession of any authenticated cases of water poisoning by Germans during the present operations on the Western front, Mr. MACPHERSON wrote: An official report has been received that the wells at Barleux, three miles south-west of Péronne, were examined and found to have been poisoned with arsenic.

MONDAY, MARCH 26TH.

Infantile Death-rate.

Answering Mr. O'GRADY, who put a question respecting the decline in the infantile death-rate to 91 per 1000 registered births, Mr. HAYES FISHER (Secretary to the Local Government Board) said: There is no foundation for the suggestion that the decline in the infant death-rate is due to the decline in the number of children who are vaccinated. The lower death-rate is not confined to districts in which vaccination is neglected, and at least one-half of the infants die before the age at which vaccination is usually performed. The decline in the infant death-rate is no doubt due to a number of causes, one of the most important of which is the valuable work which is now undertaken by local authorities and voluntary agencies for attending to the health of mothers and infants.

TUESDAY, MARCH 27TH.

Abdominal Operations at the Front.

Sir W. COLLINS asked the Under Secretary of State for War whether, having regard to the more mobile character

of the operations on the Western front and with a view to the earliest possible treatment of certain classes of wounds, especially those of the abdomen, the Army Medical Department was considering the desirability of using motor operating-theatres, similar to those supplied by the Wounded Allies Relief Committee to the Belgian and Italian armies.—Mr. MACPHERSON wrote in reply: The more mobile character of the operations on the Western front has been duly anticipated and the full equipment for an operating theatre, together with the temporary theatre itself, can be sent to the front with the personnel of a casualty clearing station wherever it is required in any part of the line.

Appointments.

Successful applicants for vacancies, Secretaries of Public Institutions, and others possessing information suitable for this column, are invited to forward to THE LANCET *Office, directed to the Sub-Editor, not later than 9 o'clock on the Thursday morning of each week, such information for gratuitous publication.*

BURNS, NESBITT O'DELL, B.A., M.B., B.Ch., B.A.O. Dub., has been appointed Medical Officer and Public Vaccinator for the Huntspill District by the Bridgwater (Somerset) Board of Guardians.

EDWARDS, CHARLES, M.R.C.S., L.R.C.P. Lond., Medical Officer of Health for Bridport.

FELTHAM, H. G., M.B., Ch.B. Edin., Medical Officer of Health for the Port of Immingham, Grimsby.

VAN INGEN, MARY A., M.B., B.S. Lond., and TRACEY, VIOLET M., L.R.C.P., L.R.C.S. Edin., L.R.F.P.S. Glasg., Medical Inspectors of Public Health Department of L.C.C.

KEMP, C., M.B., C.M. Aberd., Certifying Surgeon under the Factory and Workshop Acts for the Morriston District of the County of Glamorgan.

KIRKMAN, ALBERT HENRY BEAUMONT, F.R.C.S. Edin., M.R.C.S., L.R.C.P. Lond., Medical Officer and Public Vaccinator for the Branscombe District by the Honiton (Devon) Board of Guardians and Medical Officer and Public Vaccinator for the Axminster (Devon) District of the Axminster Union.

POOLER, H. W., M.B., Ch.B., Medical Officer to Clay Cross, Grassmoor, Shirland, Somercoates, and Stonebroom Infant Welfare Centres, Derbyshire Education Committee; and District Medical Officer of the Chesterfield Union.

ROWLANDS, W. R., M.R.C.S., L.R.C.P., Medical Officer to the British Red Cross Hospital, Netley.

SHANNON, EDITH, M.B., Ch.B. Glasg., Resident Assistant Medical Officer at the West Ham Board of Guardians' Sick Home.

TOYE, EDWIN JOSIAH, M.D., B.Sc. Lond., F.R.C.S. Eng., L.R.C.P. Lond., Acting Deputy Medical Officer of Health for Bideford (Devon).

Vacancies.

For further information regarding each vacancy reference should be made to the advertisement (see Index).
When the application of a Belgian medical man would be considered the advertisers are requested to communicate with the Editor.

BIRMINGHAM CITY EDUCATION COMMITTEE.—Temporary Assistant School Medical Officer. Salary £300 per annum.

BIRMINGHAM GENERAL DISPENSARY.—Resident Medical Officer, unmarried. Salary £300 per annum, with apartments, &c.

BIRMINGHAM AND MIDLAND EYE HOSPITAL.—Female House Surgeon. Salary £200 per annum.

BLACKPOOL, VICTORIA HOSPITAL.—House Surgeon. Salary £250 per annum, with board, &c.

BODMIN, CORNWALL COUNTY ASYLUM.—Female Junior Assistant Medical Officer. Salary £200 per annum, with board, &c.

BOLTON INFIRMARY AND DISPENSARY.—Senior House Surgeon. Salary £230 per annum, with board, &c.

BRISTOL ROYAL HOSPITAL FOR SICK CHILDREN AND WOMEN.—Female House Surgeon. Salary £150 per annum, with board, &c.

BRISTOL ROYAL INFIRMARY.—House Physician and House Surgeon. Salary at rate of £120 per annum, with board, &c.

BURY INFIRMARY.—Junior House Surgeon. Salary £150 per annum, with board, &c.

BURY ST. EDMUND'S, SUFFOLK HOSPITAL, Ampton Hall.—Resident Medical Officer. Salary £400 per annum, with board, &c.

CHARING CROSS HOSPITAL.—Resident Casualty Officer. Salary £100 per annum, with board.

CUMBERLAND, COUNTY OF.—Female Assistant Medical Officer. Salary £350 per annum.

DERBYSHIRE SANATORIUM FOR TUBERCULOSIS, Walton-lane, near Chesterfield.—Assistant Medical Officer. Salary £300 per annum, with board, &c.

DEVONPORT, ROYAL ALBERT HOSPITAL.—Assistant House Surgeon, unmarried. Salary £150 per annum, with board, &c.

EDINBURGH, ROYAL ASYLUM, Morningside.—Temporary Assistant Physician. Salary £385 per annum, with board, &c.

GENERAL LYING-IN HOSPITAL, York-road, S.E.—Resident Medical Officer for three months. Salary £100 per annum, with board.

GUY'S HOSPITAL, S.E.—Female Clinical Assistant in the Venereal Department. Salary 1 guinea per session.

HAMPSTEAD GENERAL HOSPITAL, Haverstock Hill.—Casualty Officer for Out-patients' Department. One whole time, salary at rate of £150 per annum, with board; or two half time at rate of £75 per annum each, lunch and tea provided.

HARROGATE INFIRMARY.—Resident House Surgeon.

HOSPITAL FOR CONSUMPTION AND DISEASES OF THE CHEST, Brompton.—House Physician for six months. Salary 30 guineas.

LEEDS PUBLIC DISPENSARY.—Second Female Resident Medical Officer. Salary £200 per annum, with board, &c.

LONDON TEMPERANCE HOSPITAL, Hampstead-road, N.W.—Assistant Resident Medical Officer. Salary £120 per annum, with board, &c.

MANCHESTER CORPORATION.—Assistant Tuberculosis Officer. Salary £350 per annum.

MANCHESTER, CRUMPSALL INFIRMARY, Crescent-road, Crumpsall.—Locum Assistant Resident Medical Officer. Salary £8 8s. per week, with board, &c.

MANCHESTER NORTHERN HOSPITAL FOR WOMEN AND CHILDREN, Park-place, Cheetham Hill-road.—House Surgeon. Salary £150 per annum, with board, &c.

NEWCASTLE UPON-TYNE EDUCATION COMMITTEE.—Temporary Assistant School Medical Officer. Salary £300 per annum.

NORTHAMPTON GENERAL HOSPITAL.—Three House Surgeons. Salary £150 per annum each, with board, &c.

PECKHAM HOUSE ASYLUM, 112, Peckham-road, S.E.—Medical Officer.

PORTSMOUTH COUNTY BOROUGH.—Tuberculosis Officer. Salary at rate of £500 per annum.

QUEEN MARY'S HOSPITAL FOR THE EAST END, Stratford.—House Surgeon.

QUEEN'S HOSPITAL FOR CHILDREN, Hackney-road, Bethnal Green, E.—Temporary Anæsthetist. Also House Physician, Casualty House Surgeon, and House Surgeon for six months. Salary £100 per annum, with board, &c.

REDRUTH RURAL DISTRICT COUNCIL.—Medical Officer of Health. Salary £100 per annum.

ROCHESTER, ST. BARTHOLOMEW'S HOSPITAL.—Clinical Assistant. Salary at rate of £110 per annum, with board, &c.

ROTHERHAM HOSPITAL.—Junior House Surgeon. Salary £150 per annum, with board, &c.

ROYAL FREE HOSPITAL, Gray's Inn-road, W.C.—Two House Physicians and Two House Surgeons. Salary £50 per annum, with board, &c. Also Junior Obstetric Assistant. Salary £62 per annum, with board, &c.; also care of 16 beds at Endsleigh Maternity Hospital. Salary given. Also Assistant Anæsthetist. Salary £93 per annum. Also Female Senior Obstetric Assistant. Salary £93 per annum, with board, &c. Also to attend at Endsleigh-street Maternity Hospital. Salary £60 per annum.

SHEFFIELD ROYAL INFIRMARY.—House Physician. Salary £120 per annum, with board, &c.

STOKE-ON-TRENT COUNTY BOROUGH.—Temporary Tuberculosis Officer. Salary £500 per annum.

WHITEHAVEN AND WEST CUMBERLAND INFIRMARY.—Resident House Surgeon. Salary £120 per annum, with board, &c.

THE Chief Inspector of Factories, Home Office, London, S.W., gives notice of vacancies for Certifying Surgeons under the Factory and Workshop Acts at Lydd (Kent) and Robertsbridge (Sussex).

THE Secretary of State for the Home Department, Whitehall, S.W., gives notice of a vacancy for a Medical Referee under the Workmen's Compensation Act, 1906, for the Sheriffdom of The Lothians and Peebles, to be attached more particularly to the county of Midlothian. Applications should be addressed to the Under Secretary, Scottish Office, not later than April 15th.

Births, Marriages, and Deaths.

BIRTHS.

ALEXANDER.—On March 20th, at Cade House, Riverhead, Sevenoaks, the wife of J. Finlay Alexander, M.A., M.D. Camb., of a son.

LAWSON.—At a private nursing home, Marrbank, Dundee, the wife of Captain James Lawson, R.A.M.C.—a daughter.

QUACKENBOS.—On March 26th, at U.C.H., London, the wife of Maxwell Quackenbos, M.R.C.S., of a son.

SAUNDERS.—On March 25th, at Brown-street, Salisbury, the wife of L. Dimock Saunders, M.R.C.S., of a son.

SMEED.—On March 22nd, at Springfield, Netley, Hants, to Mildred, the wife of Captain Edward Smeed, R.A.M.C. (T.F.), a daughter.

WOOLLEY.—On March 22nd, at Lucknow, the wife of Lieutenant-Colonel J. Maxwell Woolley, I.M.S., of a son.

MARRIAGES.

EASTON—WHITE.—On March 22nd, at Wirksworth Parish Church, William Cochrane Cairnie Easton, Captain, R.A.M.C., son of the late George Easton, of Ayrshire, to Lilian Dorothy, third daughter of John H. and Mrs. White, of Alderwasley, Derbyshire.

HOOPER—ARMSTRONG.—On March 21st, at the Church of St. Mary the Virgin, Gillingham, Dorset, Reginald Arthur Hooper, Captain, R.A.M.C., to Daisy, daughter of R. B. Armstrong, The Hermitage, Gateshead-on-Tyne.

MAYBURY—JAMES.—On March 19th, at Christ Church, Woburn-square, W.C., Captain A. V. Maybury, R.A.M.C. (T.F.), to Agnes Maud, second daughter of Mr. and Mrs. J. James, of West Haddon Lodge, Rugby.

DEATHS.

CLARK.—On March 13th, killed in action, William Brown Clark, M.B., B.S., Captain, R.A.M.C., aged 37.

LESLIE.—On March 20th, in London, after a long illness, Lucille Doxat Leslie, L.R.C.P., L.R.C.S. Edin., L.F.P.S. Glasg.

N.B.—A fee of 5s. is charged for the insertion of Notices of Births, Marriages, and Deaths.

Notes, Short Comments, and Answers to Correspondents.

BOOKS OF REFERENCE.

IN spite of the difficulties of publication at the present time owing to conditions produced by the war, works of reference continue to appear with commendable regularity, though the date of publication is occasionally delayed. Among those which have recently appeared are *The Year Book of the Scientific and Learned Societies of Great Britain and Ireland* (London: Charles Griffin and Co. Price 7*s.* 6*d.* net), *The Public Schools Year Book, 1917* (The Year Book Press, 31, Museum-street, W.C. Price 6*s.* net), and *Herbert Fry's Royal Guide to the London Charities, 1917* (London: Chatto and Windus. Price 1*s.* 6*d.*). The first named is a record of the work done in science, literature, and art during the session 1915–16 by numerous societies and Government institutions, the information being compiled from official sources. In addition to the lists of papers read at the different societies, details are given as to officers, dates of meetings, conditions of membership, and publications. The number of pages dealing with biology, including microscopy and anthropology, is 46, with psychology 6, and with medicine 35, while economic science and statistics occupy 12 pages. The synopsis of contents, the arrangement of the societies, and the index make the task of reference an easy task.—*The Public Schools Year Book*, which is edited by Mr. H. F. W. Deane, librarian to the Dean and Canons of St. George's, Windsor Castle, and Mr. A. Bulkeley Evans, Barrister-at-law and secretary to the Headmasters' Conference, is an admirable guide to both parents and guardians, while it is at the same time the official book of reference of the Headmasters' Conference. The public schools are arranged in alphabetical order, and full information is given with regard to governing bodies, staff, nomination and admission, entrance examination and scholarships, as well as conditions of admission to the Navy, Army, Civil Service, and other professions. The Navy and Army sections have been brought up to date and include the regulations for permanent and temporary commissions which have been introduced owing to the war. A concluding section of the book gives a list of preparatory schools and a list of tutors.—*Fry's London Charities*, which is edited by Mr. John Lane, gives in alphabetical order the charities of London with their name, date of foundation, address, objects, and annual income. In the preface reference is made to the steadily declining birth-rate, and to the fact that while the advance of science has caused a fall in the general death-rate, that for young babies has hardly gone down at all, one-fifth of the deaths occurring in the first week, one-third in the first month, and nearly half in the first three months. Mr. Lane hopes that "a day will dawn when, for the first time in the history of the world, civilisation will honestly face the fact that its true wealth is to be found not merely in the treasure-houses of the great, but in the humble cradles of the labour that fills those treasure-houses. Europe will need all, and more than all, the children that are born within the next few years."

THE RIGHT AND LEFT HANDS.

To the Editor of THE LANCET.

SIR,—With respect to the note in THE LANCET last week, under this heading, regarding muscular tremor in those unaccustomed to manual labour, I have found that holding in the hand a pear-shaped incandescent electric-light bulb containing a single filament shows rather well any tremors of the muscles, the quivering filament vibrating more or less vigorously according to the tremor, or emotion even. A sheet of fairly stiff paper horizontally held by one corner will show by its vibration of the opposite corner the state of the muscles. A cup of water will show tremor by its surface vibrations, and there are many other methods, apart from the scientific instruments employed by experts. Sedentary workers changing their employment to manual labour should learn the science of the implement. For instance, with the spade there is a right size, weight, shape, handle height, and form of tread or foot-piece (some adjustable) for the foot to be considered, and the right thrust and amount of material to be lifted at a time, and the right method of turning and throwing. These instructions are usually obtainable from old and experienced hands and those who have studied the knacks. The knowledge of the knacks must save fatigue in labour and make the work more expeditious. Some years ago in America a methodical foreman had to have cleared two large heaps of material. One lot was shovelled in the usual fashion and the other heap was removed by men using certain chosen shovels, holding and handling the shovel in a certain manner and taking certain quantities. The result was all in favour of the methodical work. The proper resting of the limbs, alternately and in rotation, and the study of the pushes and pauses, must make a considerable difference to the result both to the worker and the work.

Again, the question of liquid refreshment during and after the work is no doubt a factor. Alcoholic drinks during manual labour do not suit everybody and only produce clogging effects on the muscles after the first spurt of work so occasioned has subsided, and will sometimes tend to prolong and increase any after-tremor. In the summer of 1872 it was necessary to shift the rails of 500 miles of permanent way on the Great Western Railway from broad to narrow gauge in a fortnight, and 3000 men did it working double time, with a record of health, and drank only skilly—a successful experiment. A ration per man was allowed of 1½ lb. oatmeal and ½ lb. sugar, and the cooks prepared it in buckets, the drink being taken round to the men with pannikins.

I am, Sir, yours faithfully,
March 26th, 1917. R. I. H.

THE SUMMER TIME ACT.

IN this country and on the Continent summer-time dates for 1917 have been arranged as follows: England, April 8th to Sept. 17th; France, March 24th–25th to Oct. 7th; Italy, March 25th to Sept. 20th; Holland, April 16th to Sept. 17th; Hungary, April 16th to Sept. 17th; and Germany, April 16th to Sept. 17th.

It will be seen that France and Italy have already started summer time, and to avoid confusion this should be remembered. Summer time will start in England earlier than last year, when it commenced May 20th–21st, and ended Sept. 30th–Oct. 1st.

UGANDA HEALTH REPORT.

ACCORDING to the Blue-book of the Uganda Protectorate for the year ended March 31st, 1916, just presented to Parliament, the population of the territory is now estimated at 2,887,800. This total includes 963 Europeans, of whom 272 are females, and 3455 Asiatics (2809 males and 646 females). The conditions of general health during 1915 were satisfactory. The number of cases treated in Government hospitals and dispensaries showed a decrease to 77,467, with 205 deaths, from 90,730, with 298 deaths, in the year 1914. The number of European officials resident during the year was 481. Three were invalided, bringing the total invalided in the last five years to 18, the principal causes being nervous and mental diseases, blackwater fever, circulatory affections, and general debility. 532 Europeans (including officials) were treated at Government hospitals at Entebbe and Jinja, the principal diseases being malarial and alimentary.

Amongst the native population plague prevails mainly in the Eastern Province, although cases have occurred in other areas. The disease has increased in the Lango district of the Eastern Provinces, but its incidence elsewhere, where organisation for prevention is in force, has diminished considerably. The work of native inspectors, appointed to control both plague and small-pox and prevent the concealment of cases, has been beneficial, and rewards for the destruction of rats have been offered with good results in the Lango district. Inoculation of the general population in the endemic area with Haffkine's prophylactic was carried out only in Lango. Elsewhere, apart from a few hundred injections performed in Mbale and Soroti stations, inoculation was confined to military porters recruited from the endemic districts. The number of deaths reported from the three most infected areas are subjoined for the past two years:—

	1914.		1915.
Bukedi	1963	.....	1912
Teso	651	.....	615
Lango	624	.....	951
Totals	3238	.....	3478

The number of cases and deaths under the head of sleeping sickness have dwindled almost to a negligible quantity. The clearings made to exclude the tsetse fly from ferries and ports along recognised waterways have been maintained, but independent research has had to be postponed in consequence of the requisition of all available medical officers for military duty. The local situation necessitated the suspension of the bionomic investigations which have been conducted by Mr. W. F. Fiske for the past 27 months under the auspices of the Royal Society. It is hoped that these studies will be resumed after the cessation of hostilities, when it is anticipated that important practical experiments may be undertaken and the lessons derived from the investigations thus be carried to a satisfactory conclusion. The deaths attributed to sleeping sickness in 1915 in combined native and official returns were 352, as compared with 466 during 1914. Only 3 of these deaths occurred in Buganda Province, where, it may be recalled, the fatal cases in 1905 numbered 8003. Serious epidemics of small-pox took place in 1915–16 in the

Buganda and Eastern Provinces. In the former the strict measures adopted have practically stamped out the disease. The Eastern Province outbreak proved more widespread, and though the virulent stage of the epidemic has been overcome the disease is still prevalent in the Bugishu hills and, to a less extent, in the remainder of the Bukedi and Busoga districts.

THE PLYMPTON (DEVON) BOARD OF GUARDIANS AND MEDICAL RECOMMENDATIONS.

AN inquest was recently held at Brixton (Devon) relative to the death of a married woman. It was stated that the medical officer ordered beef-tea for the deceased, but the guardians would not allow it. The husband earned 23*s.* weekly and had nine children to provide for. The coroner remarked that the guardians incurred a grave responsibility in refusing the doctor's orders, and had the medical man only said that death had been accelerated by want of the nourishment their position would have been serious. The jury returned a verdict in accordance with medical evidence and added a rider to the effect that the "guardians' conduct was scandalous," and expressed a hope "that in future more care would be taken."

SCHOOL-BOYS' CHEMICAL EXPERIMENTS.

BEFORE Mr. Justice Darling and a special jury recently a case was tried in the High Court in which a school-boy, A. C. Askew, suing through his father as his next friend, claimed damages against the Middlesex County Council, as the county education authority, for personal injuries due to the alleged negligence of the defendants. Young Askew with other boys formed a class under the charge of Miss Rollinson, a Bachelor of Science of London University and a lady with 17 years' experience as a teacher. The boys were directed to place a certain quantity of sawdust on crucible lids to warm it, and having been given small quantities of nitric acid in test-tubes, to drip the acid on to the sawdust, using glass tubes as drippers, which they had to fetch from a drawer. For the purpose of their experiments they were divided into groups of three, one of whom would perform the experiment. One of the other boys in the plaintiff's group was looking for a tube when another boy said that the sawdust was ready, so, instead of waiting, the boy who should have found the dripper poured some of the acid from his test-tube on to the sawdust, when a violent action took place, causing disfiguring injuries upon the plaintiff's face. The evidence called on his behalf, apart from the evidence of fact, was to the effect that Miss Rollinson should have performed the experiment herself, as it was a demonstrator's experiment, instead of which she was engaged upon other work in another part of the room, and that charcoal should have been used instead of sawdust. It was also suggested on behalf of the plaintiff that the boy who handled the tube containing the nitric acid was known to be mischievous. Evidence was given on behalf of the defendants to the effect that the experiment was a proper and safe one in the circumstances, and that from an instructor's point of view it was much better to let boys conduct suitable experiments themselves than to demonstrate before them. It was submitted on behalf of the defendants that there was no evidence of negligence to go to the jury, but Mr. Justice Darling declined to withdraw the case from the jury on that ground, and eventually a verdict was found for the boy for £250 damages, and his father, who claimed compensation for the expense of medical attendance on his son, was awarded £25. Mr. Justice Darling gave judgment for these amounts, but granted a stay of execution with a view to an appeal.

A. B. J.—Any man who has signed a year's contract has the right to come out of the Service at the termination of the contract. But if he was under 41 at the time when the Military Service Act was passed he becomes liable under that Act, and therefore, of course, can be taken as a combatant. If immediately upon coming out he enrols with the Central Medical War Committee (under Army Order 485 of 1916) he can be taken for the Royal Army Medical Corps after consultation with the Committee. The agreement with the Committee is in such cases to give the man a month's notice of the date on which he will be called up. Up to the present the Central Medical War Committee has not called upon any man to re-enter the Service unless he has been at home at least a year.

The following journals, magazines, &c. have been received:—Journal d'Urologie, Dublin Journal of Medical Science, Revue d'Hygiène et de Police Sanitaire, Archives Médecine et Pharmacie Navales, Birmingham Medical Review, Canadian Practitioner and Review, Dominion Medical Monthly, American Journal of Medical Sciences, Mercy and Truth, Medico-Legal Journal, American Journal of Obstetrics, American Journal of Surgery, Surgery, Gynecology and Obstetrics, Medical Journal of South Africa, Ophthalmology, Annali di Medicina Navale e Coloniale, Interstate Medical Journal.

Medical Diary for the ensuing Week.

SOCIETIES.

MEDICAL SOCIETY OF LONDON, 11, Chandos-st., Cavendish-sq., W.

MONDAY.—8.30 P.M., Discussion on the Treatment of Arterio-Venous Aneurysm, opened by Col C. J. Symonds, R.A.M.C., C.B., and Major E. H. Jocelyn Swan, R.A.M.C.

RÖNTGEN SOCIETY, at the Cancer Hospital (Free), Fulham-road, S.W.

TUESDAY.—8.15 P.M., General Meeting.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

POST-GRADUATE COLLEGE, West London Hospital, Hammersmith-road, W.

MONDAY.—2 P.M., Medical and Surgical Clinics. X Rays. Mr. Gray: Operations. Mr. B. Harman: Diseases of the Eye. Dr. Simson: Diseases of Women.

TUESDAY.—2 P.M., Medical and Surgical Clinics. X Rays. Mr. Baldwin: Operations. Dr. Banks Davis: Diseases of the Throat, Nose, and Ear. Dr. Pernet: Diseases of the Skin.

WEDNESDAY.—10 A.M., Dr. Saunders: Diseases of Children. Dr. Banks Davis: Operations of the Throat, Nose, and Ear. 2 P.M., Medical and Surgical Clinics. X Rays. Mr. Pardoe: Operations.

THURSDAY.—2 P.M., Medical and Surgical Clinics. X Rays. Mr. Gray: Operations. Mr. B. Harman: Diseases of the Eye.

FRIDAY.—10 A.M., Dr. Simson: Gynæcological Operations. 2 P.M., Medical and Surgical Clinics. X Rays. Mr. Baldwin: Operations. Dr. Banks Davis: Diseases of the Throat, Nose, and Ear. Dr. Pernet: Diseases of the Skin.

SATURDAY.—10 A.M., Dr. Saunders: Diseases of Children. Dr. Banks Davis: Operations of the Throat, Nose, and Ear. Mr. B. Harman: Eye Operations. 2 P.M., Medical and Surgical Clinics. X Rays. Mr. Pardoe: Operations.

NORTH-EAST LONDON POST-GRADUATE COLLEGE, Prince of Wales's General Hospital, Tottenham, N.

MONDAY.—Clinics:—10.30 A.M., Surgical Out-patients (Mr. E. Gillespie). 2.30 P.M., Medical Out-patients (Dr. T. R. Whipham): Gynæcological Out-patients (Dr. Banister). 3 P.M., Medical In-patients (Dr. R. M. Leslie).

TUESDAY.—2.30 P.M., Surgical Operations (Mr. Carson). Clinics:—Medical Out-patients (Dr. A. G. Auld); Surgical Out-patients (Mr. Howell Evans); Nose, Throat, and Ear Out-patients (Mr. C. H. Hayton). Radiography (Dr. Metcalfe). 3.30 P.M., Medical In-patients (Dr. A. J. Whiting).

WEDNESDAY.—Clinics:—2.30 P.M., Throat Operations (Mr. C. H. Hayton). Children Out-patients (Dr. T. R. Whipham); Eye Out-patients (Mr. R. P. Brooks); Skin Out-patients (Dr. H. W. Barber). 5.30 P.M., Eye Operations (Mr. R. P. Brooks).

THURSDAY.—2.30 P.M., Gynæcological Operations (Dr. A. E. Giles). Clinics:—Medical Out-patients (Dr. A. J. Whiting); Surgical Out-patients (Mr. Carson); Radiography (Dr. Metcalfe). 3 P.M., Medical In-patients (Dr. R. M. Leslie).

FRIDAY.—2.30 P.M., Surgical Operations (Mr. Howell Evans). Clinics:—Medical Out-patients (Dr. A. G. Auld); Surgical Out-patients (Mr. E. Gillespie); Eye Out-patients (Mr. R. P. Brooks).

ROYAL INSTITUTION OF GREAT BRITAIN, Albemarle-street, Piccadilly, W.

MONDAY.—5 P.M., General Monthly Meeting.

METEOROLOGICAL READINGS.

(Taken daily at 8.30 a.m. by Steward's Instruments.)

THE LANCET Office, March 28th, 1917.

Date.	Rain-fall.	Solar Radio in Vacuo.	Maximum Temp. Shade.	Min. Tem.	Wet Bulb.	Dry Bulb.	Remarks.
Mar. 22	...	73	41	31	32	33	Cloudy
,, 23	0·03	66	40	30	32	33	Snowing
,, 24	0·04	73	45	28	30	31	Fine
,, 25	...	65	49	31	36	37	Overcast
,, 26	0·04	77	44	37	39	40	Raining
,, 27	0·03	74	42	31	32	34	Cloudy
,, 28	0·06	62	45	30	34	36	Overcast

Other information which we have been accustomed to give in these "Readings" is withheld for the period of the war.

EDITORIAL NOTICES.

IT is most important that communications relating to the Editorial business of THE LANCET should be addressed *exclusively* "TO THE EDITOR," and not in any case to any gentleman who may be supposed to be connected with the Editorial staff. It is urgently necessary that attention should be given to this notice.

It is especially requested that early intelligence of local events having a medical interest, or which it is desirable to bring under the notice of the profession, may be sent direct to this office.

Lectures, original articles, and reports should be written on one side of the paper only, *and when accompanied by blocks it is requested that the name of the author, and if possible of the article, should be written on the blocks to facilitate identification.*

We cannot undertake to return MSS. not used.

Offices: 423, STRAND, LONDON, W.C. 2.

MANAGER'S NOTICES.

ALTERATION IN THE PRICE OF "THE LANCET."

INCREASED war expenses and cost of production necessitate an increase of the price of THE LANCET. Commencing with the new year, the price was raised to 8*d*. The rates of subscription remain as revised in October.

TO SUBSCRIBERS.

WILL Subscribers please note that only those subscriptions which are sent direct to the Proprietors of THE LANCET at their Offices, 423, Strand, London, W.C. 2, are dealt with by them? Subscriptions paid to London or to local newsagents (with none of whom have the Proprietors any connexion whatever) do not reach THE LANCET Offices, and consequently inquiries concerning missing copies, &c., should be sent to the Agent to whom the subscription is paid, and *not* to THE LANCET Offices.

Subscribers, by sending their subscriptions direct to THE LANCET Offices, will ensure regularity in the despatch of their Journals and an earlier delivery than the majority of Agents are able to effect.

THE COLONIAL AND FOREIGN EDITION is published in time to catch the weekly Friday mails to all parts of the world.

TO COLONIAL AND FOREIGN SUBSCRIBERS.

The Manager will be pleased to forward copies direct from the Offices to places abroad at the rates shown, whatever be the weight of any of the copies so supplied.

Subscribers abroad are particularly requested to note the rates of subscriptions given on page 4.

Communications, Letters, &c., have been received from—

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